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ABSTRACT

This project examined the careers of a one percent sample of federal civil servants for the years 1963 through 1977. The areas of employment investigated included economic returns to schooling and experience, factors affecting promotion and turnover, and occupational career ladders. A series of hypotheses and objectives specified at the outset were subjected to multivariate statistical analysis using the official personnel records of more than 68,000 federal employees. The results show that the main conclusions of human capital research in economics and status attainment research in sociology hold for the federal government. However, internal labor market characteristics must also be considered for a full understanding of civil service careers. The findings suggest that mobility between major occupational categories is infrequent in the federal service, and that when it does occur the attributes of origin and destination jobs are not similar. Attribute continuity is greatest for mobility involving a change of grade or detailed occupation without a change of major categories, for employees in mid-career, not new entrants, and for two of the nine attributes considered--knowledge required by the job and its physical demands. The implication for educational practice is that a concern for teaching transferable skills to prepare students for a career of occupational change should not sacrifice thorough mastery of specific subject matters. (Author/KC)

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SCHOOLING, TRAINING, AND PATTERNS OF OCCUPATIONAL CHANGE AMONG CAREER CIVIL SERVANTS, 1963-1977*

Final Report to the National Institute of Education on
Research Conducted under Grant No. NIE-G-78-0005

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SCHOOLING, TRAINING, AND PATTERNS OF OCCUPATIONAL CHANGE AMONG CAREER CIVIL SERVANTS, 1963 - 1977

ABSTRACT

This project examined the careers of a one percent sample of Federal civil servants for the years 1963 through 1977. The areas of employment investigated included economic returns to schooling and experience, factors affecting promotion and turnover, and occupational career ladders. A series of hypotheses and objectives specified at the outset were subjected to multivariate statistical analysis using the official personnel records of over 68,000 Federal employees.

The results show that the main conclusions of human capital research in economics and status attainment research in sociology hold for the Federal government. However, internal labor market characteristics must also be considered for a full understanding of civil service careers.

The exploration of career ladders concerns the extent to which occupational change involves movement between jobs with similar attributes and, by inference, similar skill requirements. Here the findings suggest that mobility between major occupational categories is relatively infrequent in the Federal service, and that when it does occur the attributes of origin and destination jobs are not very similar. Attribute continuity is greatest for mobility involving a change of grade or detailed occupation without a change of major categories, for employees in the middle of their careers as compared to recent entrants, and for two of the nine attributes considered -- the knowledge required by the job, and its physical demands, including technical skills. The implication for educational practice is that a concern for teaching transferable skills to prepare students for a career of occupational change should not sacrifice thorough mastery of specific subject matters.

TABLE OF CONTENTS

Page Number

Title Page 1

Abstract 2

Table of Contents 3

List of Tables 5

Introduction 7

Organization of the Report 7

Research Design and Data Set 8

Human Capital Hypotheses 10

    Hypothesis 1 12

    Hypothesis 2 12

    Hypothesis 3 12

    Hypothesis 4 15

    Hypothesis 5 17

    Hypothesis 6 22

Mobility 31

    Hypothesis 7 31

    Hypothesis 8 31

    Hypothesis 9 44

    Hypothesis 10 44

    Hypothesis 11 44

Occupational Career Ladders 46

    Objective 1 46

    Objective 2 46

Page Number

Objective 3 46

Objective 4 46

Summary and Conclusions 55

Appendix A (Hypotheses and Objectives)

Appendix B (Department of Labor Final Report)

Appendix C (The Data Base)

Appendix D (Bibliography)

LIST OF TABLES

Page Number

Table 1: Education Level Attained, by GS Grade, and by Sex, August, 1974 11

Table 2: Pay Structure of Minority/Sex Groups, for Four Cohorts, 1963-1977, Predicting 1977 Salary 13

Table 3: Standardized Returns to Schooling and Experience, by Minority/Sex Group, for Four Cohorts, 1963-1977, Predicting 1977 Salary 16

Table 4: Effect of Degree Certification on Salary of Professionals and Administrators Only, for Four Minority/Sex Groups, Net of Independent Effects, Cross-Section 1977 18

Table 5: Regression Equations Predicting 1977 Salary for the On-Board, White-Collar Employees, by Educational Certification 20

Table 6: Effect of Schooling on Duration and Expense of Job Training, Cross-Section, 1974-1977 24

Table 7: Effect of Training, Education, and Experience on 1977 Salary for Five Cohorts 25

Table 8: Employee Training by Minority/Sex Group, for Average Hours of Training, % Receiving Training, and Average Cost of Training Per Worker Hour, Fiscal Year, 1976 28

Table 9: Regression Estimates of Minority/Sex Status in Predicting Differences in Cost of Institutional Job Training with Non-Minority Males Among Federal White-Collar Employees, 1974-1977 30

Figure 1: Schematic Model of Socioeconomic Achievement in the Federal Civil Service 32

Table 10: Variable Means and Standard Deviations for Five Cohorts of Career Federal Civil Servants 34

Table 11: Socioeconomic Achievement Among Longterm Employees: Net Metric Regression Coefficients for Pre-1963 Entrants to the U.S. Civil Service 37

Table 12: Socioeconomic Achievement in the Great Society and Vietnam Cohorts: Net Metric Regression Coefficients for 1963-65 and 1966-68 Entrants to the U.S. Civil Service 38

Table 13: Socioeconomic Achievement in the Nixonomics and Watergate Cohorts: Net Metric Regression Coefficients for 1969-71 and 1972-73 Entrants to the U.S. Civil Service 39

Page Number

Table 14: Effects of Education, Minority/Sex Group and Occupational Category on Termination for Entrants and Mid-Career Civil Servants 45

Table 15: A Log-Linear Analysis of Occupational Mobility, 1969-1977: Standardized Lambdas 48

Table 16: Selected 1973 and 1977 Occupational Categories of 1969 Clerical Employees (Percents) 50

Table 17: Factors in the Factor Evaluation System 51

Table 18: Continuity Coefficients for Raw Scores and Profile Scores on Nine Job Attributes, by Mobility: Entrants to the U.S. Civil Service, 1963-1973 53

Table 19: Continuity Coefficients for Raw Scores and Profile Scores on Nine Job Attributes, by Mobility: Mid-Career U.S. Civil Servants, 1965 54

Table 20: Effects of Selected Job Attributes (Raw Scores and Profile Scores) on Mobility: Entrants to the U.S. Civil Service, 1963-1973 56

Table 21: Effects of Selected Job Attributes (Raw Scores and Profile Scores) on Mobility: Mid-Career U.S. Civil Servants, 1965 57

FINAL REPORT:

Schooling, Training and Patterns of Occupational Change among Career Civil Servants, 1963 - 1977

NATIONAL INSTITUTE OF EDUCATION GRANT #78-0005

Introduction

A dominant theme in American education has been "If you want a better job, get a better education." Indeed, there has been considerable evidence that education does have a great impact on one's salary and the socioeconomic status of one's occupation. Research on "human capital" (Schultz,1961; Becker, 1964) and the monetary returns to schooling and training has found that schooling is positively associated with annual salary and/or lifetime earnings--suitably discounted for earnings foregone and expenses incurred during education (e.g., Hanoch, 1967; Hunt, 1963). Additionally, research on occupational achievement has found education to be of primary importance, especially for males (Blau and Duncan, 1967; McClendon, 1975).

Occupational change, however, is a social and individual process less well studied, although the broad outlines of occupational change have been specified in a handful of studies. The importance of occupational change cannot be overstated. With roughly five million American workers changing jobs each year--approximately six percent of the paid labor force (Byrne, 1975)--occupational change has become an essential consideration in individual vocational planning, in personnel administration within organizations, and in national labor force policies. Educators have come increasingly to recognize that adequate career preparation should develop a capacity to work at several different occupations between the time of labor force entry and that of retirement, and research is now progressing on transferability of vocational skills (see Altman, 1976). Yet educational programs aimed at career preparation, whether through schooling or through on-the-job training, require not only a knowledge of the abilities and preferences of individuals, but also a thorough understanding of the social and economic forces which constrain and facilitate occupational change (cf. McKinlay, 1976). Despite the considerable empirical and theoretical attention which social scientists have devoted to occupational mobility, however, the process of job change over the course of a career remains poorly understood. The extent to which career options are indeed patterned or structured, the forms of such regularities, and the influences which may channel a series of job transfers along, into, or out of a given pattern, have not been adequately examined. Our report aims to contribute to knowledge on schooling, training, and occupational change.

Organization of the Report

This report is organized into six main sections. First, we will discuss the research design and data set used in our analyses. Throughout this section, we will indicate the significance of certain characteristics of the Federal labor market and those which are measured in our data set.

The next three sections deal with specific hypotheses and objectives detailed in our grant proposal to the National Institute of Education (see Appendix A). These hypotheses and objectives fall into the areas of "Human capital - formal and on-the-job training," "Mobility - promotions and turnover," and "Occupational career ladders."

A fifth section is a summary of our work for the National Institute of Education with comparisons of our findings to the private sector, and to the general literature on occupational change and transferable skills. The sixth major section is that of Appendix B, our final report to the Department of Labor on work which was performed in conjunction with our NIE project.

Research Design and Data Set

The research we present in this final report is based on a two and one-half year study of a one percent sample of the automated personnel records of Federal civil servants, 1963-1977. Using Federal civil servants as a basis for considering occupational change has its problems as well as its benefits. As an internal labor market, the Federal civil service has characteristics similar to other internal labor markets: identifiable ports of entry, promotion ladders, protection from the exigencies of the external labor market. These similarities suggest that a study of occupational change in the Federal civil service will provide information generalizable to other labor markets. However, the civil service is distinctly different from the private sector in a number of ways: its operations are regulated by law; salaries are set by Congressional action and are pegged to the private sector; some services it provides are not found in the private sector. This latter consideration means that certain job opportunities available to Federal employees are not available to private sector employees, and vice versa.

Given these differences, as well as others, it is important to establish the similarity of the Federal civil service labor market to other labor markets. In this way, generalizations may be possible regarding the transferability of skills between private and public employment, as well as the similarity, or lack thereof, in occupational changes. To accomplish this task, we first used a human capital model to analyze the relationship of education, training, and earnings. These results provide the basis for a comparison of the Federal civil service with the private sector. Second, we investigate activity in the Federal civil service in promotions and turnover to gauge the extent of two types of occupational change. And third, we examine the career ladders in the Federal civil service using entry occupation, detailed occupational changes, and a skills analysis using the Factor Evaluation System.

For most of our analyses, we used data drawn from automated records maintained by the Office of Personnel Management. Since 1962, the Federal government has taken progressive steps to computerize its personnel records. It began the Federal Personnel Statistics Program (FPSP), a longitudinal work-history file on a ten percent sample of Federal civilian employees. The aim was to provide a statistical basis for work force analyses which would contribute to rational personnel management. Over the years, changes in the automated data system have improved the accuracy of the records while increasing both the amount of information stored on each employee and the number of employees in the file. In 1972 FPSP was superseded by the Central Personnel Data File (CPDF). Like its predecessor, CPDF covers virtually the entire Executive Branch, except for White House staff, intelligence personnel, employees of the Tennessee Valley Authority, and politically appointed heads of agencies. Included also are the General Accounting Office, the Government Printing Office, the U.S. Tax Court, and the administrative offices of the Federal court system (see Schneider, 1974). Transaction histories are now maintained on 100 percent of these employees.

Monthly agency reports, submitted to the Office of Personnel Management by each Federal agency, have been merged with the CPDF to provide constant updating of personnel actions occurring throughout the Federal civil service. In the report that follows, we draw from that compilation of data. The bulk of the original data analysis in the chapters that follow is based on the official personnel records of a one percent sample of Federal employees, drawn primarily from FPSP and CPDF. Additional files, such as the Minority Group Designator File, the Retired Military File, and the Training File, were also tapped for information to build our longitudinal file, referred to here as the Federal Career File, or FCF. This composite data file on over 69,000 individuals employed by the Federal government for any length of time between January, 1963 and June, 1977 was made available for our use by the Office of Personnel Management.

The information included on FCF is of considerable variety. For example, on each Federal employee a status record as of June, 1977 (or as of their separation from Federal employment) includes information on birth date, education, agency, geographic location, sex, minority group status, pay group, salary, veteran's status, length of Federal experience, and so forth. The dynamic analysis in our study is possible from the information contained on transaction records for each employee. The number of personnel transaction records varies by employee, and in principle has no upper bound. The minimum is one, for those who had just entered Federal service in June of 1977 or shortly before, or whose first transaction in FPSP recorded their departure from the Federal service. The observed maximum in our sample is 64 for a long-term employee with, quite obviously, frequent transactions. The average is 8. Personnel actions recorded include, but are not limited to, grade increase, occupation change, merit pay increase, salary adjustment, demotion, geographic change, agency transfer, furlough, military leave, and separation, with codes available to distinguish the reasons for a transfer, separation, or furlough. Personnel actions can also include a change in status, such as from career-conditional appointment to career, or from excepted service to competitive. Many of these terms will be discussed in later sections. Readers who wish more detailed information should consult the Federal Personnel Manual, Processing Personnel Actions, and Personnel Data Standards, all published by the Office of Personnel Management (formerly the U.S. Civil Service Commission).

The final portion of FCF consists of information on job training by employee from 1974 through 1977, and includes cost and hours of training, purpose of training, type of training, and other related data. We are able, by the manner in which these various data elements were merged into FCF, to link demographic characteristics of an individual with a history of personnel transactions and training instances.

For our research under this grant, we used the data from the FCF to assess the effect of various individual worker characteristics (such as education, years of experience, etc.) on salary using least squares regression analysis. Specific characteristics, or variables, of interest were operationalized and their effects on salary or turnover were assessed net of the effects of other confounding characteristics such as age, sex, and race. While there are certain limitations in this method of analysis (the specifics of which are discussed later), this method of analysis follows in the tradition of human capital and status attainment research, as well as being a suitable method to maximize the detailed information in our data set.

An additional source of data used for the objectives in this report was generously supplied by the Personnel Research and Development Center (1974). The Factor Evaluation System is a technique designed to assist in proper classification and grading of Federal civilian General Schedule jobs, which are non-supervisory in grades 1 through 15 (where 18 is the top grade). Through several steps of selection, evaluation, and weighting, a set of first five, and then nine, job factors was defined and tested for use in position classification. Some of these factors represent, we believe, skills in dealing with technical information, other people, and communication. We will use these factors as independent indicators of skills to assess the relationship of various skills to types of occupational change. The reader should be cautioned, however, that our skill measure inheres in the occupation of an individual, and not in the individual *per se*. That is, persons are assumed to have high knowledge mastery if they are located in an occupation which requires such mastery. Hence our measure of skill levels are only approximate. We shall return to this problem in our discussion of occupational career ladders.

HUMAN CAPITAL - FORMAL AND ON-THE-JOB TRAINING

In the human capital tradition, education holds a prominent position in the determination of wages. Arguing that the main determinants of productivity are cognitive abilities and technical skills, proponents of the human capital perspective predict that both societal and individual income differences will reflect differences in investments to develop these abilities and skills. Consistent with the prediction, a number of studies focusing on individual level data have shown years of schooling to be positively associated with annual salary and/or lifetime earnings--suitably discounted for earnings foregone and expenses incurred during education (e.g., Hanoch, 1976; Hunt, 1963). Though somewhat reduced, the association holds when measures of individual ability are controlled (see articles and reviews in Solmon and Taubman, 1973).

The Federal government is no exception to these general findings. As the data from Table 1 show, the higher General Schedule grades (i.e., the higher paying positions) tend to have persons with a bachelor's degree or higher as occupants. For example, of all GS 14-15's, 78 percent of the male employees have at least a B.A. degree, while the same is true of 77.6 percent of the women in the GS 14-15 category. In the GS 16-18 grade group, we find a similar percentage of male and female employees having high levels of education. As might be expected, the percentage of employees who have graduate schooling is higher in these grades than in any other grade grouping.

Table 1: Education Level Attained, by GS Grade, and by Sex, August, 1974[a]

	GS GRADE GROUP											
Education Level	GS 1-4		GS-5-8		GS 9-11		GS 12-13		GS 14-15		GS 16-18	
	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
Less than H.S.	18.4%	7.2%	10.4%	4.0%	3.7%	1.8%	1.1%	1.0%	0.4%	0.3%	0.2%	2.0%
H.S. Graduate	37.8	47.6	31.2	37.8	17.7	22.3	10.6	12.8	5.6	6.0	2.9	1.0
Training Beyond H.S.	11.7	18.7	11.8	21.2	11.7	13.4	6.3	9.2	3.2	4.7	1.5	5.0
1 Year College	17.7	16.9	16.0	19.6	14.8	16.6	9.8	12.3	5.2	5.6	1.9	2.0
2-4 Years College	10.1	7.2	12.2	9.7	12.4	10.2	10.8	9.3	7.6	5.7	4.8	4.0
Bachelor's Degree	3.2	1.8	13.6	5.8	20.9	16.9	23.5	18.3	19.5	10.4	14.6	10.9
Graduate Study	1.1	0.6	4.8	2.0	18.8	18.8	37.9	37.1	58.5	67.2	74.1	75.2
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

[a] From a 100% count. Source: U.S. Civil Service Commission (n.d.)

Conversely, very small percentages of employees in the highest grade groupings have only a high school diploma or less education. Indeed, for the categories of less than high school and high school graduates, we find that the percentage distribution of employees across the six grade groupings consistently decreases from the GS 1-4 to the GS 16-18 group, with only one slight exception. These data alone suggest the importance of education in the grade distribution of employees. On the other hand, that some employees are in the managerial and administrator grade groups without a college degree suggests that it is possible to perform administrative functions without formalized higher education. That is, over twenty percent of all GS 14-15's have attained their positions without having what is generally regarded as a necessity for entry into the managerial positions, a college degree. Thus, forces other than educational credentials affect career success in terms of General Schedule grade. The work experience of an employee is no doubt important in increasing his or her value to an employer since many work skills can only be learned through experience. In the case where a work process is learned only by doing, rather than by schooling, an employer might very well rate experience higher than education and promote employees on the basis of seniority. Thus, on-the-job training or experience can be substituted or actually preferred to education for certain positions.

Our first set of hypotheses deals directly with trying to estimate the effects of education and experience separately. We hypothesized that:

H(1) Years of school and amount of experience will be positively associated with salary.

H(2) The association in H(1) will be stronger for white males than for females and minorities.

H(3) The highest returns to schooling will be for those employees who have high levels of education and high levels of experience.

The results from our analyses which attempt to examine these hypotheses are presented in Table 2.

We used regression analysis to predict salary for each minority/sex group in each cohort. Presented in Table 2 is an estimate of the pay structure of each group for each entry cohort. In short, the b-coefficients for each of the independent variables used to predict salary is an estimate of the average effect of that variable in determining the salary of a given employee (see Kluegel, 1978; Taylor, 1979) . The pay structure thus determined can be compared across cohorts and across minority/sex groups for changes over time by particular independent effects.

Given the emphasis of the government in using merit criteria for employment, we would predict the following. First, we would expect given past patterns of hiring and advancement that education, while positively related to salary for all groups [H(1)], has a stronger effect on salary for white males than for any other group [H(2)]. This is due in large measure to the use of education as a selection instrument for white males, and the exclusion of women and minorities from higher-paying occupations regardless of their education. Second, however, the effect of education on salary for white males should be

TABLE 2 : PAY STRUCTURE OF MINORITY/SEX GROUPS, FOR FOUR COHORTS, 1963-1977, PREDICTING 1977 SALARY[a]

	Independent Variables	Cohorts 1963-65	1966-68	1969-71	1972-73
White Males	Education	1398***	1445***	897***	984***
	Experience	35	159***	-209*	163***
	Experience^2	.12	-.67*	1.93**	-3.22#
	Entry Age	179	850***	219	932***
	Entry Age^2	-1.26	-11.41**	.31	-12.00*
	D.C.	4417***	4327***	4484***	3387***
	Disabled Vet.	-622	-940	-2634#	-304
	Other Vet.	-820	-27	895	-721
	R^2 (adjusted)	.416	.457	.473	.444
	N	300	387	193	254
	$\bar{X}$ 1977 Salary	$23,306	$20,788	$18,844	$15,628
White Females	Education	1503***	1572***	1387***	1004***
	Experience	-43	25	79	68***
	Experience^2	.29	-.02	-.18	-.65
	Entry Age	188	-45	248	318*
	Entry Age^2	-3.88	.81	-2.62	-4.62*
	D.C.	3947***	3018***	3525***	515
	Disabled Vet.	10	-2971	—	—
	Other Vet.	916	47	-530	-769
	R^2 (adjusted)	.514	.467	.573	.406
	N	169	252	105	237
	$\bar{X}$ 1977 Salary	$13,700	$12,641	$12,611	$10,688
Minority Males	Education	2033***	1929***	929	1221***
	Experience	274	467#	17	121*
	Experience^2	-.86	-2.31#	.73	-4.29
	Entry Age	651	-2119*	1502	978#
	Entry Age^2	-9.70	40.92**	-22.29	-12.89
	D.C.	-1859	369	4853	467
	Disabled Vet.	422	3062	-1038	-2092
	Other Vet.	845	-1044	1595	-2895*
	R^2 (adjusted)	.470	.531	.190	.427
	N	22	43	23	63
	$\bar{X}$ 1977 Salary	$18,897	$16,889	$15,185	$13,908
Minority Females	Education	1576	991***	1280***	664***
	Experience	-106	94	46	23
	Experience^2	.57	-.44	-.11	.71
	Entry Age	-235	-472	561	69
	Entry Age^2	2.31	9.61#	-8.97	-.97
	D.C.	1803#	1472	-905	368
	Disabled Vet.	-67	-4586	—	—
	Other Vet.	936	-1145	-484	-1534#
	R^2 (adjusted)	.362	.269	.331	.640
	N	48	100	59	78
	$\bar{X}$ 1977 Salary	$12,778	$11,602	$11,592	$9,723

a: Levels of statistical significance on this table and on all subsequent tables are: #, $p \le .1$; *, $p \le .05$; **, $p \le .01$; and ***, $p \le .001$.

greater in the older cohorts [H(3)]. However, as more and more minorities and women are selected for employment and placed into occupations similar to white males, we would expect that education increases in its effect on employee's salary. Therefore, we might observe a different pattern for minorities and women as compared to white males. Finally, the explained variance in salary should be higher for white males than for any other group since the use of merit criteria has been applied to differentiate mainly among that group of employees to the exclusion of others. That is, human capital variables such as education and experience should do more to explain variations in salary where they have been instrumental in determining access to jobs and promotions.

The returns to the human capital variables themselves display a surprising pattern. Both education and experience have generally positive effects on salary [H(1)]. The effect of education on salary becomes greater the older the cohort [H(3)], but the effect of experience declines over the four cohorts. These patterns are generally observed for all four minority/sex groups. However, the effect of education on 1977 salary is generally lower for white males than for any other minority/sex group [H(2)]. This suggests that education may be used differently for different groups of employees. For example, education can be used as a screening mechanism for entry, where minorities and women are less likely to be placed into the good jobs. However, education might also be used internally as a selection mechanism more for women and minorities than for white males. That this may be so can be inferred from an understanding of career lines. If white males tend to have more predictable career lines in which they move on an established career ladder, education within the labor market may not be as important in differentiating employees. If, on the other hand, women and minorities can use their education to jump occupational divisions for increased salary, then education would have a greater affect on their 1977 salary than on their entry salary relative to white males.

However, experience does not seem to have a pronounced effect on 1977 salary within the cohorts, and this pattern seems to hold for all four minority/sex groups. Basically, what is demonstrated here is that the effect of experience on salary within a cohort loses its importance within the first few years. In essence, the difference in accumulated skills between an employee who has worked 14 years versus one who has worked 10 years is considerably smaller than the difference between an employee who has worked 5 years compared with an employee of only 1 year. Similarly, entry age has in general a positive affect on 1977 salary suggesting that experience outside the Federal government contributes to earnings. However, the effect is strongest for the more recent cohorts.

Location in D.C. is especially important in the pay structure of white males across all four cohorts. Being in the home office of the Federal government increases their salary by $3,387 for the newest cohort to approximately $4,400 for the earlier three cohorts. A similar effect, although considerably smaller, is found for white women. This pattern is consistent with what we know of the structure of careers. Location in D.C. has a larger pay-off for the older cohorts since: (1) the highest paying jobs in Federal employment are located in D.C., and (2) most recruits are not hired directly into these jobs but must move through the civil service for some period of time.

However, neither group of minority employees has a consistently positive effect from employment in D.C. Given the recruitment pool for the D.C. area this finding is understandable. Whites who are in D.C. may have moved there for a promotion; hence, location in D.C. is only associated with higher salaries rather than causing higher salaries. On the other hand, the labor force of the D.C. area is approximately 70 percent black, so that minorities who are in Federal employment in D.C. were more likely to have been recruited into lower level jobs in the D.C. area than were whites.

Finally, the effect of veterans' preference variables on salary is mostly negative; 19 of the 28 coefficients are negatively signed, but only three approach statistical significance in the two-tailed test. The fact that the preference is generally negative may suggest that persons of lower ability are brought into the Federal government and do not compete as well with other employees. This seems true of all groups of employees, not only white males. Given the lack of statistical significance, however, the effect of veterans' preference on salary is not very pronounced. Therefore, it appears that the preference is more likely to have effect in retention rights during reduction-in-force, and preference for a claim on a job, rather than in the promotion and salary of employees once on-board the Federal work force.

In summary, what stands out most clearly from an examination of the pay structure of the four minority/sex groups for 1977 salary is that our expectations of returns to education and experience work best for white males and are only somewhat applicable to women and minorities. This is not to argue that education and experience do not affect the salary of minorities and women. Rather, the importance of such variables is qualitatively affected by the sex and race of the individual employee. Such effects are probably mediated by occupational stream, and are also variable across the timing of the career in ways different from white males.

However, we have dealt with only the unstandardized effects of education and experience on salary. It could be that since both education and experience have different mean values and different standard deviations, that we should examine the standardized effects of these two variables on salary. Hence, we hypothesized that,

> H(4) Returns to schooling and to experience will be similar in magnitude.

Presented in Table 3 are the standardized estimates (the beta's) of the effects of education and experience on 1977 salary, controlling for the same independent variables as in Table 2. The standardized estimates adjust for differences in the measurement of the two variables, so that we might better compare the magnitudes of the effects of education and experience on salary.

As is evident from the table, very few coefficients for education and experience are similar in magnitude. Education generally has a greater effect on salary than does experience, for all cohorts and minority/sex groups with only two exceptions. Indeed, as we noted from Table 2, the coefficient for education nearly always attained statistical significance whereas the coefficients for experience rarely did so. The explanations for this finding may be that we have eliminated a good deal of the explanatory power of experience by breaking our sample into cohorts. Most studies in the human capital tradition look to the cross-sectional effects of experience, and find statistical significance. Indeed, in some of our earliest work on this project we found

Table 3: Standardized Returns to Schooling and Experience, by Minority/Sex Group, for Four Cohorts, 1963-1977, Predicting 1977 Salary.

Minority/ Sex Group	Independent Variables[a]	Cohorts 1963-65	1966-68	1969-71	1972-73
White Males	Education	.525	.580	.346	.461
	Experience	.126	.576	-.584	.257
White Females	Education	.549	.630	.608	.580
	Experience	-.224	.118	.252	.217
Minority Males	Education	.748	.656	.368	.501
	Experience	.740	1.452	.072	.231
Minority Females	Education	.551	.437	.576	.754
	Experience	-.678	.639	.172	.163

a: Net of additional effects of variables included in Table 2. R^2's and N's remain the same as in Table 2.

experience to be significantly related to salary in the cross-section by minority/sex group (Taylor, 1979).

Nevertheless, the results from Table 3 suggest that education has generally a stronger effect on salary than does experience. Part of this effect could be due to the occupational group that an employee is hired into; that is, education may have an effect not only because of the important skills learned in the educational setting, but also because of the degree required by some occupations for entry. We therefore hypothesized that,

> H(5) Controlling for years of schooling and government experience, earned degrees will be positively associated with salary.

This hypothesis was somewhat modified in the course of our study. Rather than focus on the number of earned degrees (such as B.A., M.A., etc.), we focus instead on whether the occupation an employee has entered requires a particular educational credential, such as a B.A. in psychology, an M.D., etc.

The Federal government provides two sets of standards for job and employee analysis. One standard for job evaluation is the Classification Standards, in which the duties, responsibilities, working relationships, technical skills, etc., for persons employed in a particular occupation at a given level (i.e., job) are described. This is somewhat analogous to the demand side of a market analysis. The "mirror" to the Classification Standards, or the supply side of a market analysis, is the Qualification Standards, which describe the experience and/or education an individual must have to qualify for entry into a job. These standards report whether an individual must have a degree in a particular field, or whether experience can be substituted for some or all of the education. We will use this information to analyze the credentialing hypothesis put forth by Berg (1970), Collins (1979), and others.

Essentially, the view expressed by these writers is that different levels of education do not necessarily differentiate levels of skills. Rather, different levels of education suggest the possibility of trainability to an employer, the presence of certain values such as deferring gratification and future time orientation, or even native ability. Hence, an education credential is worth more to an employee than the sum of the years of schooling taken to get the degree.

When qualifications for job entry are as highly specified as in the Federal civil service, the researcher is able to determine the degree of educational certification required for hiring and placement. Using the Qualifications Standards as a guide to the presence of a requirement for educational certification, four groups of white-collar occupations were designated as roughly representing different degree requirements. The first two groups, referred to as Certification 1 and Certification 2, reflect the fact that persons who enter jobs with a given occupational title must have an educational degree in that field (see footnotes a and b, Table 4). These jobs are primarily in the medical, legal, and engineering fields. However, since some medical jobs are highly sex-typed (e.g., nurses), as well as there being both a substantial difference in length of training and large salary difference between nurses and physicians, the Certification 1 group represents the more male-dominated occupations which require certification for entrance, while Certification 2 represents the generally recognized female-typed occupations.

Table 4: Effect of Degree Certification on Salary of Professionals and Administrators Only, for Four Minority/Sex Groups, Net of Independent Effects, Cross-Section 1977.

Certification Group	Minority/Sex Group[d]			
	Non-Minority Males	Non-Minority Females	Minority Males	Minority Females
N	(4,246)	(1066)	(394)	(251)
Certification 1[a]	2,820***	4,984***	4,300***	4,496*
Certification 2[b]	-3,721***	-787*	-4,106#	4,473
Education Specified[c]	-487*	818*	0	-303

[a] Occupations in the Certification 1 Category in the White-Collar Work Force include: Safety Officer, Chaplain, Medical Officer, Pharmacist, Optometrist, Podiatrist, Dentist, Electrical Engineer, Electronic Engineer, Aerospace Engineer, Marine Engineer, Naval Architect, Mining Engineer, Petroleum Engineer, Agricultural Engineer, Ceramic Engineer, Chemical Engineer, Industrial Engineer, General Attorney, Veterinarian, Engineer, Safety Engineer, Materials Engineer, Architect, Civil Engineer, Sanitary Engineer, Mechanical Engineer, Nuclear Engineer, Biomedical Engineer, Tax Examiner, Administration Law Judge, Deportation and Exclusion, Adjudicating, Patent Attorney, Tax Law Specialist, Metallurgist, Educational and Vocational Trainer, Aircraft Operation, Fire Prevention Engineer, Welding Engineer.

[b] Occupations in Certification 2 include: Nurse Anesthetist, Nurse, Public Health Nurse, Occupational Therapist, Physical Therapist, Corrective Therapist, Manual Arts Therapist, Educational Therapist, Medical Technologist, Speech Pathology and Audiology, Dental Hygiene, and Education and Vocational Training.

[c] Occupations which Require Considerable Training in a Given Field, but not Necessarily Certification or a Specific Level of Education include: Economist Psychologist, Sociologist, Social Worker, Archeologist, Computer Analyst, Communication Specialist, Microbiologist, Pharmacologist, Zoologist, Plant Physiologist, Entomologist, Botanist, Range Conservationist, Soil Scientist, Agronomist, Financial Manager, Accountant, Budget Administrator, Dietician, Medical Research Librarian, Landscape Architect, Financial Analyst, Realty Series, Patent Advisor, Health Physicist, Geophysicist, Hydrologist, Physicist, Chemist, Astronomer, Meterologist, Geologist, Oceanographer, Cartographer, Geodesist, Librarian, Actuary.

[d] Net of the effects of years of schooling, age and age squared, veteran's preference, Federal experience and experience squared, position occupied, supervisory status, and location in D.C.

A third occupational group consists of those occupations in which the educational field is specified (Education Specified), but a degree in that field is not required per se. All other professional and administrative occupations are included in the fourth category.

In Table 4, we present the effects of credentials on salary for four minority/sex groups, controlling for nine independent variables. The regression analysis used three dummy variables (Certification 1, Certification 2, and Education Specified) as predictors on 1977 salary. The deleted category of the certification variables is that group of professional and administrative occupations which require no particular education to fill, although in hiring for these positions there is a general preference for persons with a bachelor's degree. The coefficient for each certification group, then, is the difference in average salary between that group and the deleted category.

For minority males, for example, those persons who are in occupations which require a degree in the medical fields, engineering, law, etc., make $2,820 more in salary than do those persons in the "Other Professionals and Administrators," the deleted category. Similarly, white females make almost $5,000 more in the Certification 1 group than do females in other occupational groups. The same is true for minority males; however, minority females do almost as well in the Certification 2 group. The Certification 2 group represents occupations which require a particular degree, but which are generally female-typed occupations (nurse, medical technologist, etc.). Hence, minority females who might have very limited opportunities in the "Other Professionals and Administrators" group, could do better in an occupation where entry is highly specified, even if it is poorly paid relative to male-typed occupations.

Another way to examine the effect of degree certification on salary is to compare the effects of predictor variables on salary within certification groups. The results from regression analyses predicting 1977 salary within each educational group are presented in Table 5. The unstandardized regression coefficients for each of thirteen independent variables are given, along with their significance levels, the explained variance, and the elasticities for both years of schooling and experience. The earnings function for each educational group explains alarge amount of the variance in salary, from .517 to .613, thus indicating again, a good fit of these variables.

In the educational group of Certification 1, the analysis includes those employees in occupations which involve a lengthy course of study and in which a degree is required for entry. Even though a considerable amount of the power of education should be used in explaining entry into these occupations, there is nonetheless a considerable effect of years of education on salary. The value of schooling within this educational group is approximately $1134 per year of schooling. The elasticity coefficient which indicates the percentage change in the dependent variable for a percentage change in the independent variable also suggests a strong positive effect of schooling on salary. Indeed, a one percent change in schooling is associated with a .736 change in income.

In the Certification 2 group, years of schooling also shows a strong effect on 1977 salary. However, the schooling coefficients from Certification 1 and Certification 2 do not differ by a statistically significant amount. This may in part be due to the truncated salary range for physicians in the Federal government. Medical doctors enter at a rather high salary level, but

Table 5: Regression Equations Predicting 1977 Salary for the On-Board, White Collar Employees, by Educational Certification

	Certification 1[a]	Certification 2[b]	Education[c] Specified	Other Professional and Administrator
Years of Schooling	1134***	1096***	825***	996***
(Elasticity)	.736	1.05	.608	.705
Experience	311***	306***	650***	480***
(Elasticity)	.161	.187	.429	.397
Experience^2	-3.78#	-2.82#	-10.05***	-6.77***
Age	1287***	112	718***	762***
Age^2	-10.83***	-.57	-6.91***	-7.55***
Disabled Vet	-2488*	-1749	-1874**	-1841***
Other Vet	-1818***	-327	-1148***	-637**
Supervisory	-311	129	579***	-96#
Position Occupied	3500***	2436***	-589*	-715***
D.C.	1736***	3207***	3299***	4958***
Minority Male	-510	-572	-1222*	-1762***
Non-Minority Female	-2144*	-957*	-2727***	-4117***
Minority Female	-2897	-797	-4313***	-4728***
R^2 (adjusted)	.520	.643	.543	.454
N	973	440	1025	3541
$\bar{X}$ Salary	$26,729	$16,110	$22,167	$20,901
$\bar{X}$ Education	17.4	15.4	16.3	14.8

a: Occupations in the Certification 1 Category in the White-Collar Work Force include: Safety Officer, Chaplain, Medical Officer, Pharmacist, Optometrist, Podiatrist, Dentist, Electrical Engineer, Electronic Engineer, Aerospace Engineer, Marine Engineer, Naval Architect, Mining Engineer, Petroleum Engineer, Agricultural Engineer, Ceramic Engineer, Chemical Engineer, Industrial Engineer, General Attorney, Veterinarian, Engineer, Safety Engineer, Materials Engineer, Architect, Civil Engineer, Sanitary Engineer, Mechanical Engineer, Nuclear Engineer, Biomedical Engineer, Tax Examiner, Administration Law Judge, Deportation and Exclusion, Adjudicating, Patent Attorney, Tax Law Specialist, Metallurgist, Educational and Vocational Trainer, Aircraft Operation, Fire Prevention Engineer, Welding Engineer.

b: Occupations in Certification 2 include: Nurse Anesthetist, Nurse, Public Health Nurse, Occupational Therapist, Physical Therapist, Corrective Therapist, Manual Arts Therapist, Educational Therapist, Medical Technologist, Speech Pathology and Audiology, Dental Hygiene, and Education and Vocational Training.

c: Occupations which Require Considerable Training in a Given Field, but not Necessarily Certification or a Specific Level of Education include: Economist Psychologist, Sociologist, Social Worker, Archeologist, Computer Analyst, Communication Specialist, Microbiologist, Pharmacologist, Zoologist, Plant Physiologist, Entomologist, Botanist, Range Conservationist, Soil Scientist, Agronomist, Financial Manager, Accountant. Budget Administrator, Dietician, Medical Research Librarian, Landscape Architect, Financial Analyst, Realty Series, Patent Advisor, Health Physicist, Geophysicist, Hydrologist, Physicist, Chemist, Astronomer, Meterologist, Geologist, Oceanographer, Cartographer, Geodesist, Librarian, Actuary.

because of the structure of the Federal pay system, their salary is not nearly as great as in the private sector. Hence, many highly specified M.D.s are likely to leave Federal employment for more lucrative positions elsewhere even though attempts have been made to increase physicians' salary above the white-collar pay schedule.

For those occupations in which education is highly specified but a degree per se is not required, the return to each year of education is approximately $825, with an elasticity of .608. And, in the educational group where there is much less educational specificity, the return to an additional year of schooling is $996, with an elasticity of .705. In each educational group, years of schooling has a considerable effect on salary even though a credentialing effect has already been substantively controlled. Moreover, the b coefficient for years of schooling in the education specified model differs significantly from every other schooling coefficient.

While these results are in no way conclusive, they do suggest that there is a considerable education effect over and above a credential effect across several educational categories. We have not examined here the relative effects of ability, motivation, nor type of schooling, all factors which could affect the returns to schooling. Nonetheless, it is quite possible that measures of ability would diminish the credential effect as well as the effect of years of schooling in any subsequent analysis. Thus the relative effect of credential vs. years of schooling on salary would remain fairly stable.

The additional human capital variables yield relationships with salary which have been discussed to some extent earlier. In summary, both age and experience have positive earnings slopes, though the rate of return to these characteristics declines over time. Disabled veteran's status has a greater negative coefficient associated with salary than does the other veteran category.

For the Certification 1 group, being in the excepted service has a strong positive effect on salary. This is due no doubt to the fact that many lawyers, for example, are hired into excepted positions due to the political nature of their work. Or, as is the case with physicians, salaries are elevated in many excepted positions so that the Federal government can better compete with the private sector in retaining physicians. Similarly, in the Certification 2 group, excepted service is positively related to salary. For the other two educational groups, however, positions in the excepted service have a negative relationship with salary. And as with earlier analyses, location in the District of Columbia is quite beneficial for all three educational groups. However, the difference between D.C. and field status for the Certification 1 group is somewhat smaller than for the other three educational groups.

Of special note in the analysis of the credential versus education argument is the relative effects of minority/sex status on salary. For example, Doeringer and Piore (1971:141) have argued that, "in general, internal allocative rules, being less nebulous than entry rules, cannot be as readily adjusted to mask continuing discrimination." Stated in another way, given the specificity of rules within an internal labor market regarding hiring, promotion, transfer, etc., there should be less salary discrimination than in non-protected labor markets. Taking this reasoning further, a plausible argument could be made that within a BLM, the greater the specification of occupational requirements, the less the salary discrimination. Indeed, Blalock's theoretical propositions on occupational discrimination contain related arguments (1961:245-246). For example, "the greater the competition among employers for persons with high performance levels, the lower the degree of minority discrimination by employers." And, "to the extent that it is difficult to prevent the minority from acquiring the necessary skills for high performance, the lower the degree of discrimination." It is generally argued by employers that "qualified" minorities and women are difficult to find. Therefore, if the arguments of Doeringer and Piore, and Blalock are valid, minorities would be hired and well-paid in those occupations where there is greater competition among employers. Given the results of the regression analyses, it appears that this line of argument seems to hold for minority males. In those occupations which have the most highly specified educational entry requirements, and where there is considerable competition from the private sector, minority males have salaries not significantly different from white males. Even in those educational categories where there is less educational specificity, minority males do not lag far behind white males. More importantly for this analysis, the less specified the entry educational requirement, the greater the salary disparity.

For women, however, the results still suggest some salary disparity for all four educational groups. Both minority and non-minority women lag far behind white males in salary, from $2727 to $4728, with the largest salary disparities found in the group with the least amount of educational specificity. While the pattern of findings is not completely linear, it appears that both groups of women are better off vis-a-vis white males in occupations where there is a high degree of educational specificity. These findings again suggest that the administrative rules can be used to reduce labor marketing inequality.

Experience and Job Training

There are additional types of learning which may be as important to an organization and thus to the career of an individual within the organization. Generally, it is believed that experience on-the-job is an informal way of learning, and this assumption forms the basis of much of the research in on-the-job training (see Mincer, 1962, discussed below). Experience at a particular task should facilitate productivity as a worker becomes familiar with a task, and therefore the worker needs less supervisory guidance, makes fewer mistakes, etc.

Also important, however, is formal job training. This training is formal in the sense that it is given in a classroom environment, with a specified instructor, teaching materials, and hours of training, and it is usually apart from the work site. We refer to this type of training as institutionalized job training (or IJT) as distinct from on-the-job training (OJT).

Very little is known about IJT, as most research to date has concentrated on returns to experience or OJT. However, the Federal Civil Service Commission has kept records on formal job training received by employees beginning in 1974. We hypothesized that,

> H(6) Duration and expense of job training will be positively associated with years of schooling.

Using the training records provided by CSC, we estimated the effect of education on hours of IJT received and cost of IJT. We reasoned that the greater the amount of schooling, the more likely that there would be training programs to further advance and fine tune an employee's skills. Persons with high levels of education would show "trainability" to the employer, and would probably be in fields which required even more specific training.

Presented in Table 6 are the results of our analyses. We included in our study those persons who were on-board in 1974 regardless of when they entered, and were still on-board in 1977. Given some exigencies with the data, we used only training records for 1975 and 1976. Therefore, the effects presented in Table 6 represent the effect of schooling on IJT received in 1975 and 1976. Three models are presented. In Model 1, we estimated the effect of schooling on training without additional controls, and as we hypothesized, there was a substantial effect. For example, for every year of schooling an employee had, s/he received, on the average, $23.91 in IJT in 1975 and 1976.

In Model 2, we estimated the effect of schooling on receiving training controlling for age and experience. Again, we found substantial education effects, although these were somewhat reduced from Model 1. That is, the more education a person has, the more likely s/he is to receive training.

However, when we controlled for occupational stream (Professional, Administrative, Technical, Clerical, and Other) by using a set of dummy variables in the regression analysis, we found the effect of education on training completely eliminated. This suggests to us that education is important in determining the amount of training one receives, but its effect is almost completely indirect, operating through occupational stream. That is, education may determine one's occupational group, but it is occupational group which in turn determines the amount of IJT an employee receives.

An additional question which is important to us, is the extent to which training affects salary of an employee. Essentially, do the skills learned in training, or the fact that someone has been to a training course have an effect on his or her salary.

In Table 7, the results from regression analyses predicting salary from IJT and other employment variables which would likely affect the relationship of training and salary are presented for five cohorts of employees. The amount of job training received by an employee is measured here by the cost of training during 1975 and 1976, the only years for which reliable training data were available for this analysis. The training data were used over the two years since some career development plans might call for a series of courses spread over considerable time. Salary is then regressed onto cost of training, years of schooling, age, length of government experience, minority/sex group, occupational group, and pre-training salary separately for each of five cohorts. The explained variance is reported for each of the regression analyses, and it varies between $R^2 = .840$ to $R^2 = .920$. The high R^2 is due in large measure to the control variable of pre-training salary. In effect, salary in 1974 is predicting salary in 1977. This control variable is necessary since differences in salary previous to training may have an effect on how much training an individual receives. Moreover, the pre-training salary level may also influence salary step increases leading to the 1977 salary. By controlling pre-training salary approximately in 1974 or early 1975 we should be indirectly controlling

Table 6 : Effect of Schooling on Duration and Expense of Job Training, Cross-Section, 1974-1977.

Effect of Education by Model[a]	Hours of Training	Cost of Training
Model 1	3.82***	23.91***
Model 2	3.56***	22.70***
Model 3	.04	-4.17
R^2 in full model (adjusted) (N = 10,360)	.041	.029

a: Model 1 effects are without controls. Model 2 effects are controlled for experience and experience squared, age and age squared. Model 3 additionally controls for the effects of occupational stream (Professional, Administrative, Technical, Clerical and Other).

Table 7: Effect of Training, Education, and Experience on 1977 Salary for Five Cohorts

Independent	Cohort, by Entry Year				
Variables	1963-65	1966-68	1969-71	1972-73	1974
Training	-.02	-.29*	-.03	-.03	.69***
Years of Schooling	144***	130***	324***	123**	113***
Experience	-.05	20.3	30.7	121*	66.40#
Experience^2	-.02	-.15*	-.03	-1.07*	1.45
Age	-90	6.06	124	114*	27.69
Age^2	.82	-.17	-1.24	-1.52*	-.51
Minority Male	-288	-270	255	-264	-403#
Non-Minority Female	-499***	-659***	-1304***	-984***	-410**
Minority Female	-493*	-597***	-1402***	-947***	-294
Administrative	385*	255	1356***	389	472*
Technical	-193	-493*	-1097***	-1474***	-1258***
Clerical	-260	-143	-728*	-1188***	-1393***
Other	-599	-1642***	-1953*	-2899***	-1556***
Pre-Training Salary	101***	105***	70***	98***	93***
R^2 (adjusted)	.920	.918	.844	.840	.895
N	998	1262	756	761	691
$\bar{X}$ Cost of Training	132	122	250	112	168
$\bar{X}$ Hours of Training	31	31	45	39	51

for such pay increases and thereby not risk attributing such increases to the effect of training. For those persons who received no training, their pre-training salary was set equal to their 1974 salary.

What is most striking from the results presented in Table 7 is that IJT has very little effect on employees' salary for any cohort except the most recent entrants to the civil service. In the 1974 cohort, for every dollar spent on IJT, an employee received approximately sixty-nine cents in increased salary by 1977, net of the effects on salary due to education, age, and months of Federal experience. While there is a negative coefficient for all four other cohorts for training on salary, only the 1966-68 cohort has a statistically significant coefficient. For this cohort, money spent on training apparently had a negative effect on 1977 salary. The results suggest that for every dollar spent on IJT, an employee would make approximately twenty-nine cents less in annual salary. This cohort is the age-lump group in which large numbers of persons were hired to fill positions in the Federal government during the Vietnam War expansion. It is quite possible that given the relative wide recruiting net cast during this period, persons with less than optimal skills were hired into the government. Therefore, the training given to this cohort may be in some sense for less than satisfactory workers. Hence, selection for training carries with it a negative connotation which cannot be offset by the positive effect from skills learned in training sessions. This is, of course, conjecture and some alternative explanation should be explored. For example, competition in the 1966-68 cohort may be so great, that time away from the work site, even for training, results in a net disadvantage for employees.

In general, however, the effect of training seems to be non-significant (when the effect of education, and pre-training salary are removed), except for the latest cohort. This suggests that training has an effect only for the new employee. In all other cases, the positive effect from training, if there is one, is captured completely by the Federal government as an employer. This general finding is somewhat consistent with other explanations of market behavior in the human capital model. New employees have a considerable amount of information to learn and sort for future reference in their working careers. Training courses can provide them with the tools to perform their work quickly and efficiently. On the other hand, older employees are more likely to be more firmly established in their work and in their career trajectories, so that training programs do not add the same increment to possible job changes, occupational shifts, or agency moves which could then be translated into greater salary. Therefore it would seem, from the employee's perspective, that training programs such as those measured here provide salary increments only during the first few years of Federal employment. No doubt, a week away from the regular office scene is welcomed by many employees, but employees should not necessarily expect that their salary level will be affected by such training.

Of interest also from the results presented in Table 7 is the finding that for every cohort, minorities and women fall farther behind white males in salary in the space of three years or less with only one exception (minority males, in the 1969-71 cohort). That is, even though minorities and women have disparate salaries as compared with white males previous to receiving training, these salary disparities continue to increase even when training, an internal labor market device for reallocating skills, is controlled. Given the possible usefulness of training as a remedy for unequal access to education previous to job entry, we must ask the question, what is the relationship of minority/sex status and IJT?

Minority/Sex Status and Institutional Job Training

Of special concern here is whether institutional training programs are differentially allocated across minority/sex groups. In the Federal civil service, explicit emphasis has been given to training in equal employment opportunity efforts. According to Executive Order 11478 (1969), Federal agencies are to "provide the maximum feasible opportunity to employees to enhance their skills so they may perform at their highest potential and advance in accordance with their abilities." Minorities and women, who it might be argued suffer educational disadvantages, could benefit greatly from training programs. Therefore, equitable practices in the allocation of training courses are of particular importance to equal employment opportunity policies.

The data in Table 8, however, suggest that there may yet be some inequality in the allocation of training opportunities among Federal civil servants. Using aggretate data compiled by the U.S. Civil Service Commission (1977), we find that non-minority men are favored in hours of training, percent of all employees receiving training, and average cost of training. They received on the average about 28 hours of training each during fiscal 1976, but non-minority women received only about 16 hours. Over three-fifths of all non-minority males received some interagency training, while less than half of non-minority and minority females received training. Finally, the average cost for each hour of training received was $4.91 for non-minority males; $4.04 for minority males; $2.66 for non-minority females; and only $2.39 for minority females. In essence, minorities and women were trained for fewer hours than non-minority males, with a smaller percentage receiving any training at all; what training they did receive was of substantially lower "quality" (as measured by cost per hour) than that received by non-minority males.

Of course, such indicators of training inequality might be biased by a number of job-related factors not explicitly controlled in the table. For example, some occupations might simply require less training than others, and these occupations might be filled predominantly by minorities and women. Moreover, if there is a positive relationship between training and education because employers use educational credentials as a proxy for trainability (Thurow, 1969), then those employees who have the highest levels of education will have the greatest amounts of job training (Mincer, 1962).

To answer the question, "Does minority/sex status affect the opportunity to receive training in the Federal civil service?" COST of training was regressed onto AGE, AGE^2, EDUCATION, EXPERIENCE, EXPERIENCE^2, PRE-TRAINING SALARY, PATCO, NON-MINORITY FEMALES, MINORITY MALES, and MINORITY FEMALES. To answer the question, "Does access to IJT, as well as returns to IJT, vary by time in the career?," the sample was divided into two groups of employees: (1) new entrants to the Federal government as of June, 1974, who were still "on-board" in June,

Table 8: Employee Training by Minority/Sex Group, for Average Hours of Training, % Receiving Training, and Average Cost of Training Per Worker Hour, Fiscal Year, 1976[a]

Training	Minority/Sex Group			
	Non-Minority Males	Minority Males	Non-Minority Females	Minority Females
Average Hours of Training Per Employee	27.6	24.7	16.2	16.8
Percent of All Employees Receiving Training[b]	61.9	53.1	47.0	45.6
Average Cost in Dollars Per Hour of Training[c]	4.91	4.04	2.66	2.39

[a] For General Schedule and similar employees only.

[b] Based on number of training slots filled, rather than number of individual participants.

[c] Includes travel, training instruction, and supplies. Does not include salary of trainees.

Source: Bureau of Training (1977)

1977 (ENTRANTS, 1974) and (2) those employees who were on-board in June, 1974, regardless of their entry date, and were still in Federal employment in June, 1977 (ON-BOARD, 1974).

Presented in Table 9 are the regression coefficients for three minority/ sex groups in three models predicting cost of IJT.

The three dummy variables for minority/sex status are net of education, age, and square of age for the 1974 entering group of employees. The results in Model 1 show that all three groups received fewer funds in IJT than did non-minority males, and that both groups of female employees received considerably less than non-minority males. Among the cross-section of employees in 1974, all three minority/sex groups received an average of $100 or less than non-minority males in IJT during 1975 and 1976. When a control for occupational stream is introduced as in Model 2, differences in access to IJT drop by about 25% for the 1974 entrants, and by about one-third for the on-board group. Nonetheless, all coefficients remain negative, and five of the six are statistically significant. When pre-training salary is entered in Model 3, the coefficients for the three minority/sex groups among the entrants remain substantially the same as in Model 2. This is undoubtedly due to the fact that for any group of entrants during one year, a control for education and PATCO is highly correlated with GS-grade, the determinant of salary in the Federal white-collar service. Among the on-board employees, the coefficients for predicting IJT for minority/sex status are somewhat reduced in Model 3. Over time, salary trajectories would vary by minority/sex group so that each group has a different pre-training salary level by the training dates analyzed here. Therefore, pre-training salary would have a somewhat different effect on predicting IJT for a cross-section of Federal employees than for an entering cohort.

In summary, there appears to be differential access to IJT by minority/ sex group even when education and occupational stream are controlled, with minority females receiving fewer training funds than any other group. And although only two of the six coefficients for minority males are significantly different from non-minority males, all six minority male coefficients for training received are negative. Similar to rewards such as salary (Taylor, 1979), and supervisory status (Kleugel, 1978), minorities and women appear to receive less of IJT than do non-minority males.

However, access to IJT is important only if it contributes to the well-being of an employee. Apart from the personal gratification and intellectual stimulation which training sessions may give, we need to consider whether the effect of IJT on salary varies by minority/sex group. To estimate whether there are, in fact, different monetary returns to IJT, an earnings function for each minority/sex group was estimated using 1977 salary as the dependent variable. Cost of IJT was entered as a predictor variable in regression equations along with additional control variables specified in three separate models. The results of these analyses are presented in Appendix B. In general, we find that the returns to training are greater for minorities and women, than for white males. These findings are somewhat contradictory with earlier studies (Mincer, 1962), but we believe them to be representative of the types of work opportunities available to women and minorities.

Table 9: Regression Estimates of Minority/Sex Status in Predicting Differences in Cost of Institutional Job Training with Non-Minority Males Among Federal White-Collar Employees, 1974-1977

Minority/Sex Group by Regression Model	Employee Group	
	Entrants, 1974[d]	On-Board, 1974[d]
Model 1[a]		
Minority Males	-48.9	-80.7***
Non-Minority Females	-140.8***	-102.3***
Minority Females	-177.0**	-122.6***
Model 2[b]		
Minority Males	-45.7	-45.2*
Non-Minority Females	-95.7*	-59.5***
Minority Females	-139.2*	-62.5**
Model 3[c]		
Minority Males	-45.6	-30.4
Non-Minority Females	-95.3*	-28.7*
Minority Females	-138.9*	-34.9*

---

a: Variables entered into the model are education, age, square of age, each of the minority/sex variables, length of Federal service, and square of length of service.

b: Variables entered in the model are education, age, square of age, PATCO, the minority/sex variables, length of Federal service, and square of length of service.

c: Variables entered in the model are education, age, square of age, PATCO, pre-training salary, the minority/sex variables, length of Federal service and square of length of service.

d: Levels of statistical significance are: #, $p \leq .1$; *, $p \leq .05$; **, $p \leq .01$; and ***, $p \leq .001$. For the Entrants, R^2 of model 3 = .082, (N=691); for the On-Board, R^2 of Model 3= .041,(N=10,360).

In summary, we find that the Federal civil service operates as other internal labor markets might operate. We find that education is the primary predictor of salary, in the Federal government, similar to other studies. However, the effect of education on access to training is mediated by occupational group, an hypothesized effect. Educational credentials also seem to be important in salary attainment in the civil service, regardless of race, sex, experience, or years of schooling of the employee. Finally, the effect of IJT on increasing salary is variable by minority/sex group as is access to such job training, but in countervailing ways.

We turn now to an analysis of mobility in the Federal civil service.

MOBILITY - PROMOTIONS AND TURNOVER

The concept of intragenerational mobility has received considerable attention since the work of Blau and Duncan (1967). In this section we present a model of career attainment which fits the characteristics or important elements of the Federal civil service, the bureaucratic labor market (referred to here as the BLM). We examine a status attainment model, using path analytic methods, to assess various determinants of careers, and career change. The model of socioeconomic achievement examined in this section (Figure 1) is based on that which is now standard in the status attainment literature (see especially Kelley, 1973), with modifications appropriate to the Federal BLM.

We examine two hypotheses and one objective in the following discussion.

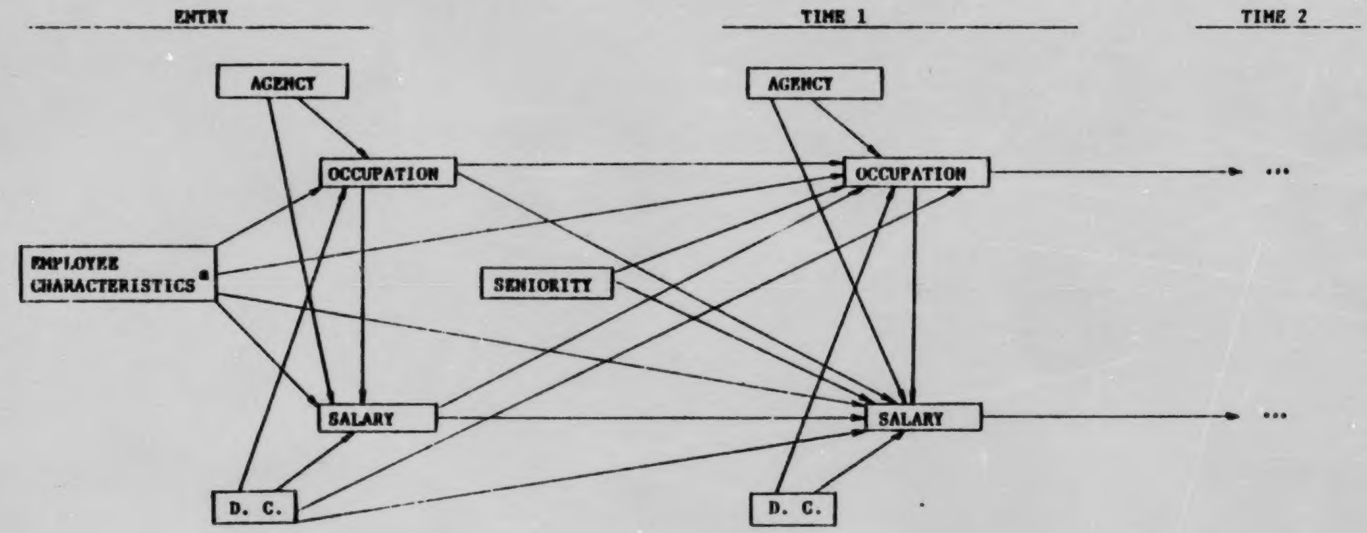
H(7) With entry level controlled, years of schooling will be positively associated with promotion.

H(8) With education and grade controlled, there will be a negative association between promotion and age after forty years of age.

O(1) What are those entry occupations which lead to subsequent mobility?

Two major dimensions of socioeconomic achievement in a BLM are salary and occupational prestige. Salary corresponds closely with organizational rank, though allowance is also made for seniority. Thus the Federal General Schedule pay system has up to 10 seniority steps within each of its 18 hierarchical grades. In part the correspondence with rank reflects the common assumption that authority relations will be undermined if subordinates are paid more than their nominal superiors (Doeringer and Piore, 1971:86). In addition, "the average official naturally desires a mechanical fixing of the conditions of promotion: if not of the offices, at least of the salary levels...from the lower, less important, and lower paid to the higher positions" (Weber, 1968:963). Since such desires for "orderly" careers (Spilerman, 1977) are in accord with bureaucratic rationalization and with an organization's need for a stable, motivated work force, they are often realized in the salary structure of a BLM. In short, personal income has customarily appeared in status attainment and related human capital models, but

FIGURE 1: SCHEMATIC MODEL OF SOCIOECONOMIC ACHIEVEMENT IN THE FEDERAL CIVIL SERVICE


ENTRY
TIME 1
TIME 2
AGENCY
OCCUPATION
EMPLOYEE CHARACTERISTICS[a]
SENIORITY
SALARY
D. C.
AGENCY
OCCUPATION
SALARY
D. C.
...
...

---

[a] Combined for simplicity under the heading of employee characteristics are education, age, minority group, sex, blue-collar entry port, veteran status, kinship with another Federal employee, farm origin, father's occupation, and last non-Federal occupation.

salary is of greater interest within a BLM because it is simultaneously a measure of individual economic reward and a formal attribute of an organizational position.

In a BLM, where a salary structure is established and administered rationally (in the Weberian sense), there are at least two straight-forward mechanisms through which salary is affected by occupational prestige. First, "there are occasionally wage relationships that are dictated by the status of a job which management is forced to recognize" (Doeringer and Piore, 1971:87). That is, social definitions of appropriate remuneration may link occupational prestige with salary. Second, the salary structure of a BLM is typically based on elaborate methods of job evaluation and position classification (Caplow, 1954; Doeringer and Piore, 1971; Grandjean, 1980). The Federal government's Factor Evaluation System described in greater detail later is a case in point. These methods depend on classifiers' ratings of jobs on rather abstract dimensions such as complexity of the work or the level of knowledge required. Any bias in such ratings from the halo of occupational prestige will create an additional linkage between occupational standing and salary (cf. Asch, et al., 1938). Again, status attainment models often use a socioeconomic status scale for occupation rather than a prestige measure (see Featherman and Hauser, 1976a), but the latter is theoretically more appropriate here. In addition, the empirical stability of prestige ratings across groups and over time (Treiman, 1977) suggests that the application of a nationally derived scale within a single BLM is more defensible than would be the case for socioeconomic status.

Accordingly, our model postulates occupational prestige as a determinant of salary, and occupation and salary at earlier times as influencing occupation and salary at later times. The BLM variables added to the model as determinants of rewards include seniority, agency, and employment in the Washington, D.C. metropolitan area (the Federal "home office"), along with a variety of other employee characteristics, both biographical (education, age, sex, ethnicity, social origin) and bureaucratic (veterans' preference, entry port).

The model is estimated separately for each cohort using ordinary least squares regression, and the regression coefficients are interpreted as indicating the direct causal influences of the variables in the model on prestige and salary (see Duncan, 1975). In Hernes' (1976) terms, we examine differences over time in the output structure (the distribution of outcomes) and in the parameter structure (the strengths of relationships), but assume a constant process structure across cohorts (namely the causal model summarized in Figure 1).

History and Career in the U.S. Civil Service

Demographics. A summary view of the output structure characterizing each cohort is provided in Table 10, which presents descriptive statistics for all variables in the model. The variable labels in the table briefly indicate the operational definitions discussed more fully in Appendix C. For the two most recent cohorts, two time-points in the career cycle are examined, entry and early post-entry (i.e., 1977), while for the Great Society and Vietnam cohorts, the longer time-span covered permits an examination of entry, early post-entry

TABLE 10: VARIABLE MEANS AND STANDARD DEVIATIONS FOR FIVE COHORTS OF CAREER FEDERAL CIVIL SERVANTS[a]

Cohort:	Longterm (pre-1363)			Great Society (1963-65)			Vietnam (1966-68)			Nixonomics (1969-71)		Watergate (1972-73)	
Date of Variable: Variable (and Units)	1963	1970	1977	Entry	1970	1977	Entry	1970	1977	Entry	1977	Entry	1977
Education (years)	14.01 2.36	—	—	13.83 2.26	—	—	13.78 2.24	—	—	14.14 2.36	—	13.80 2.21	—
Entry Age (years)	35.11[b] 7.33	—	—	31.80 9.15	—	—	30.93 9.36	—	—	29.27 9.27	—	27.45 8.37	
Entry Age Squared (years squared, 100s)	12.86[b] 5.13	—	--	10.95 5.98	—	—	10.44 6.17	—	--	9.42 6.04	—	8.23 5.33	—
Seniority (months)	108.08 73.81	188.46 73.29	265.36 73.58	0 0	72.74 13.11	149.77 13.86	0 0	43.43 10.98	120.14 12.18	0 0	81.34 10.26	0 0	48.11 7.11
Minority (1,0)	.141 .348	—	—	.162 .369	—	--	.203 .403	—	—	.216 .412	—	.221 .415	—
Female (1,0)	.271 .444	—	—	.333 .472	—	—	.400 .490	—	—	.430 .495	—	.460 .499	—
Blue-Collar Entry (1,0)	.063[b] .243	—	—	.074 .262	—	—	.065 .246	—	—	.046 .211	—	.030 .170	—
Disabled Veteran (1,0)	.082 .275	—	—	.071 .257	—	—	.042 .201	—	—	.043 .204	—	.032 .177	—
Other Veterans' Preference (1,0)	.527 .499	—	—	.403 .491	—	—	.356 .479	—	—	.338 .474	—	.318 .466	—
Defense & Related Agencies (1,0)	.402 .490	.368 .482	.354 .478	.269 .444	.281 .450	.258 .438	.379 .485	.371 .483	.331 .471	.271 .445	.253 .435	.260 .439	.228 .420
Postal Service (1,0)	.159 .366	.160 .367	.160 .367	.360 .480	.348 .477	.349 .477	.286 .452	.286 .452	.290 .454	.211 .408	.210 .407	.237 .426	.232 .422
Veterans' Administration (1,0)	.074 .262	.077 .266	.077 .267	.054 .226	.050 .219	.053 .224	.053 .224	.055 .228	.062 .241	.094 .293	.102 .303	.102 .303	.107 .309
H.E.W. & Related Agencies (1,0)	.054 .226	.072 .258	.071 .258	.071 .257	.082 .275	.089 .284	.080 .272	.082 .275	.085 .279	.096 .295	.109 .312	.121 .327	.135 .342
D.C. (1,0)	.109 .312	.098 .297	.129 .335	.114 .318	.090 .286	.127 .333	.123 .329	.097 .296	.119 .324	.120 .325	.142 .350	.169 .375	.158 .365
Occupation (Siegel prestige)	47.93 10.78	48.95 10.52	49.86 10.15	45.36 10.54	47.02 10.41	48.55 9.97	44.68 10.35	45.49 10.14	47.07 9.85	46.38 11.06	48.32 10.67	44.59 9.43	46.13 9.55
Salary (1977$, 100s)	132.06 46.27	163.97 62.65	204.29 76.57	101.89 36.38	131.93 53.22	176.54 63.78	101.20 37.97	120.06 49.64	162.55 60.65	103.53 42.17	136.60 60.59	97.44 36.76	130.86 48.38
N	—	—	2214	—	—	814	—	—	1023	—	668	—	742

a: Data are for Federal civil servants who were full-time, white-collar on June 30, 1977, and who entered during one of the periods shown. Source, variable definitions, and further sample restrictions are discussed in the text and in Appendix C. Means are reported for each variable as of the date in the column heading, with standard deviations immediately below the respective means. For variables which are assumed constant over time, statistics are reported only once.

b: As of 1963; entry data unavailable.

(1970), and mid-career (1977). Because entry characteristics are unavailable for pre-1963 entrants, the data on longterm employees are confined to three time-points in the middle to late career (1963, 1970, and 1977).

Observe first that each cohort displays consistent upward mobility between the earliest time-point and 1977, with respect to average levels of both salary and occupational prestige. This conforms to a view of the bureaucratic labor market as a setting for orderly careers (see Spilerman, 1977). Since the data cover only those still employed in 1977, the apparent upward mobility may also be due in part to self-selection, if upwardly mobile individuals are more likely to remain in the Federal service.

Table 10 shows that shifts in the relative size of Federal agencies since 1963 have come about largely, but not entirely, through cohort succession rather than through movement between agencies by individual members of the cohorts. Within a cohort, changes in the proportional distribution across agency categories tend to echo growth and decline, but only faintly. Much more striking are the differences between cohorts. Thus, as Ryder (1965) points out, organizations (like societies) are modified more by replacing individuals than by moving them around. Similarly, the intercohort increase in the proportion of Federal employees working in D.C. has come about in spite of an opposite intracohort tendency toward more work assignments in the field during the early post-entry stage of the career.

In addition to substantial growth in the Federal employment of women and minorities (cf. Krislov, 1974), the table suggests an intercohort decline in the proportions of blue-collar entrants and veterans (see Bureau of Manpower Information Systems, 1976; Gartaganis, 1974). However, the figures reported here exaggerate the latter trends somewhat. Recent blue-collar entrants have had less time to make the transition to white-collar work, and hence fewer have done so. Veterans enjoy some statutory protection from reductions-in-force, and hence would constitute a higher proportion of those still employed in 1977 for the earlier cohorts than for cohorts which have been at risk of layoff a shorter period of time. A similar process helps account for the intercohort decline in average age at entry, since the employment choices of younger entrants are generally less permanent than those made by older entrants.

Given the precautions taken in constructing the cohort samples, we find that some important intercohort differences correspond to historical influences on the Federal BLM. For example, the output structure of the Nixonomics cohort is singular in several respects. Entering during a period of declining Federal employment and national economic recession, the 1969-71 cohort nevertheless enjoyed the best starting salary (in constant dollars) and the highest average occupational prestige of the four recent cohorts. Furthermore, it achieved in just 80 months of service an average salary nearly equal to that which the cohorts preceding it required 120 to 190 months to attain. The mean education of the cohort, highest of the five groups, suggests that increasing unemployment in the external labor market between 1969 and 1971 permitted the Federal government to recruit more highly trained personnel during this period. Thus the socioeconomic success of the Nixonomics cohort can be partially explained by normal returns on abnormally high educational qualifications. As results reviewed in the following subsections clearly demonstrate, however, this is by no means the whole story. A variety of pervasive historical influences have operated to differentiate the careers of the five cohorts.

Explanatory power of the model. What draws immediate attention in the next three tables is the considerable power of the model to account for variation in occupational prestige and salary. Whether at entry or later in the career, however simple or elaborate the prediction equations, and whatever the cohort, the R^2 values at the bottom of each table show that the variance explained always exceeds one-fourth, usually approaches half, and often exceeds 80 percent. Even the simplest "human capital" prediction equation (Equation 1), in which the only independent variables are education, age, and the square of age, accounts for about 40 to 50 percent of the variance in 1977 salary in every cohort. In this respect the Weberian view of a BLM as a highly rationalized personnel system receives convincing support.

The other independent variables in the model cannot be readily identified as either "human capital" or "bureaucratic labor market" characteristics. For example, the influence of entry occupation or starting salary on the later career may be viewed either as reflecting indirect effects of human capital, or as demonstrating the extent to which initial placement determines subsequent success in a BLM. Similarly, human capital theorists such as Becker (1964) would regard seniority as an indicator of enterprise-specific skills or on-the-job training, but its effects might also be attributed to BLM regulations designed more to promote employment stability than to stimulate "investments" in this type of human capital (see Doeringer and Piore, 1971).

Wherever the line is drawn between human capital and BLM variables, the R^2 values reported in the tables suggest that the explanatory importance of BLM characteristics cannot be dismissed, bureaucratic rationality notwithstanding. Under the most restrictive assumptions, with education, age, occupation, salary, seniority, and even minority group and sex all treated as non-BLM variables, and with the explained variance already above 80 percent, the remaining variables still add several percentage points to the explanatory power of the model. Thus, while the Weberian view of the rationalized BLM is supported, there are apparently other influences on members' careers in the Federal government which also warrant examination.

The explanatory power of the model is substantially uniform across cohorts, but the effect parameters show some important intercohort differences. In the following subsections, we examine each of these effects in approximately the order in which they appear in the tables. Our discussion relies on apparent patterns of effects, without recourse to formal significance testing for intercohort differences.

"Human capital" effects: education, age, and seniority. Overall, a year of education returns about 2 prestige points at entry, and $400 in starting salary. Education continues to bring direct returns in both prestige and salary throughout the career, though at diminishing rates. These results are consistent with the predictions of human capital theory, and our earlier analyses, which sees education as a proxy for productive skills valued by employers (e.g., Becker, 1964), but they do not rule out alternative interpretations. Returns to education could also reflect mainly "credentialism," or simply the beneficial effects of the "cultural capital" that formal schooling helps develop, including work attitudes and interpersonal styles acceptable to one's superiors (see Collins, 1979). Except in a handful of occupations, Federal law prohibits the use of an educational credential as an exclusive qualification for employment. However, education is explicitly permitted as a substitute for

TABLE 11: SOCIOECONOMIC ACHIEVEMENT AMONG LONGTERM EMPLOYEES:
NET METRIC REGRESSION COEFFICIENTS FOR PRE-1963 ENTRANTS TO THE U.S. CIVIL SERVICE[a]

Dependent Variable:	Occupation			Salary ($100)		
Date of Dependent Variable:	1963	1970	1977	1963	1970	1977
Independent Variable						
Education	2.28***	0.66***	0.21**	4.31***	3.50***	1.69***
Age, 1963	0.71***	- 0.35*	- 0.14	3.45***	- 1.70*	0.10
Age^2, 1963 (100s)	- 0.89**	0.42#	0.21	- 4.00***	1.77#	- 0.96
Seniority[b]	0.00	0.00	- 0.00	0.20***	- 0.02#	0.00
Minority	- 2.79***	- 0.58	0.09	- 9.60***	- 4.04**	- 3.68*
Female	- 4.18***	- 1.50***	0.12	-23.33***	-16.16***	- 5.99***
Blue-Collar, 1963	-12.33***	2.46***	2.21***	3.44	-12.03***	- 0.24
Disabled Veteran	- 3.75***	- 0.59	0.43	- 8.40**	2.02	0.23
Other Veterans' Preference	- 1.55***	- 0.43	0.39	- 0.67	1.13	1.18
Defense/State[b]	0.32	- 0.35	- 0.43	- 0.91	- 0.87	- 9.17***
Postal[b]	- 2.80***	- 1.30**	- 0.83*	-15.72***	-25.08***	9.64***
V.A.[b]	1.68*	- 0.49	1.18**	- 6.92*	- 8.03***	- 7.86***
H.E.W./H.U.D.[b]	- 3.59***	- 0.77	- 0.47	- 2.60	10.15***	2.87
D.C., 1963	1.46**	1.61*	0.26	9.33***	0.79	-11.87***
D.C., 1970	--	- 0.56	0.30	--	11.20***	9.79***
D.C., 1977	--	--	0.10	--	--	9.56***
Occupation, 1963	--	0.66***	0.16***	1.41***	0.13	0.08
Occupation, 1970	--	--	0.63**	--	0.74***	- 0.01
Occupation, 1977	--	--	--	--	--	0.40***
Salary, 1963 ($100)	--	0.01#	0.00	--	0.88***	0.10***
Salary, 1970 ($100)	--	--	0.00	--	--	0.99***
Constant	- 1.20	12.49***	11.03***	-109.06***	-14.92	-17.68
R^2 Values[c]						
Equation 1	.371	.360	.314	.329	.399	.405
Equation 2	--	.659	.698	.418	.794	.890
Equation 3	.371	.659	.698	.514	.794	.890
Equation 4	.382	.661	.698	.549	.797	.893
Full Equation	.468	.666	.702	.569	.820	.902

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[a] Unstandardized coefficients from ordinary least squares regression with all relevant independent variables controlled. Two-tailed significance tests are reported as follows: *, $p < .05$; **, $p < .01$; ***, $p < .001$. Coefficients significant at the .05 level but only in a one-tailed test are indicated by #.

[b] As of the date of the dependent variable.

[c] All R^2 values have been adjusted for degrees of freedom. Equation 1 includes as predictors for each dependent variable only education, age, and the square of age. Equation 2 adds occupation and salary as predictors. Equation 3 further adds seniority, and Equation 4 includes all of the foregoing plus minority group and sex. The full equation includes all relevant independent variables shown in the table, and is the equation for which the regression coefficients are reported.

TABLE 12: SOCIOECONOMIC ACHIEVEMENT IN THE GREAT SOCIETY AND VIETNAM COHORTS:
NET METRIC REGRESSION COEFFICIENTS FOR 1963-65 AND 1966-68 ENTRANTS TO THE U.S. CIVIL SERVICE[a]

Cohort:	Great Society (1963-65)						Vietnam (1966-68)					
Dependent Variable:	Occupation			Salary ($100)			Occupation			Salary ($100)		
Date of Dep. Var.:	Entry	1970	1977	Entry	1970	1977	Entry	1970	1977	Entry	1970	1977
Independent Variable:												
Education	1.99***	1.02***	0.15	3.83***	3.98***	1.74***	2.16***	0.86***	0.64***	4.78***	1.47***	1.34***
Entry Age	0.39	0.23	- 0.30#	2.96***	0.29	- 0.92	0.49*	0.21	0.02	2.09**	0.04	- 0.02
Entry Age^2 (100s)	- 0.56	- 0.32	0.43	- 3.00*	- 0.71	0.80	- 0.73*	- 0.26	- 0.11	- 1.83#	- 0.18	- 0.16
Seniority[b]	—	0.02	0.01	—	0.23**	0.03	—	- 0.03*	- 0.04**	—	0.26***	- 0.10#
Minority	- 2.17**	- 0.21	- 0.15	0.40	- 0.56	- 1.81	- 1.25*	- 1.07*	- 0.30	- 0.02	- 0.50	- 4.65**
Female	- 4.69***	- 1.80**	- 0.30	-12.85***	-13.72***	-13.05***	- 4.86***	- 1.76***	0.29	-10.71***	- 6.71***	- 8.67***
Blue-Collar Entry	-15.33***	2.80**	1.70*	6.33	- 2.33	- 3.60	-15.22***	1.53*	4.16***	7.70*	- 0.58	- 1.68
Disabled Veteran	- 0.70	- 0.74	- 0.25	- 1.31	- 0.43	1.47	- 2.32*	- 0.37	0.27	6.20	- 0.16	- 2.17
Other Vet. Pref.	- 1.26	- 1.29*	0.32	4.20#	- 1.80	- 3.47	- 2.15***	- 1.12*	- 0.40	7.00***	1.70	0.92
Defense/Space[b]	1.25#	- 0.37	- 0.62	9.10***	3.99#	- 6.33**	1.43*	- 0.33	- 0.73	7.59***	- 8.50***	-10.22***
Postal[b]	- 3.16***	- 1.92**	- 1.60*	7.63**	-22.37***	12.71***	- 1.11	- 0.54	- 1.27*	8.07***	-25.01***	14.68***
V.A.[b]	- 1.12	- 0.93	1.37	- 2.95	- 3.93	- 3.48	- 1.24	- 0.44	- 1.63*	- 4.70	- 8.37**	-13.50***
H.E.W./H.U.D.[b]	- 1.93#	- 1.20	0.22	4.66	8.04*	3.91	- 1.37	- 0.08	0.62	13.31***	- 3.32	2.69
D.C., Entry	0.97	- 0.16	0.20	13.91***	1.31	-11.36**	0.41	3.08***	- 0.63	10.12***	5.73*	- 0.26
D.C., 1970	—	0.73	- 1.03	—	6.68#	14.81***	—	- 2.26*	- 0.46	—	1.26	- 0.82
D.C., 1977	—	—	0.63	—	—	9.92*	—	—	0.71	—	—	13.39***
Occupation, Entry	—	0.61***	0.16***	1.34***	0.08	- 0.38**	—	0.68***	0.12***	1.38***	- 0.28*	- 0.08
Occupation, 1970	—	—	0.34***	—	1.14***	0.16	—	—	0.36***	—	0.93***	0.12
Occupation, 1977	—	—	—	—	—	0.44***	—	—	—	—	—	0.67***
Salary, Entry ($100)	—	0.01	- 0.01	—	0.72***	0.01	—	0.00	0.01	—	0.96***	- 0.16***
Salary, 1970 ($100)	—	—	0.02*	—	—	1.01***	—	—	0.00	—	—	1.10***
Constant	10.72*	- 1.17	16.48***	-97.96***	-74.71***	8.41	5.16	0.67	11.17***	-97.74***	-30.66***	- 1.75
R^2 Values[c]												
Equation 1	.309	.397	.336	.325	.484	.437	.342	.415	.411	.392	.456	.434
Equation 2	—	.665	.663	.463	.782	.856	—	.734	.674	.513	.844	.863
Equation 3	—	.665	.663	—	.785	.857	—	.735	.677	—	.865	.862
Equation 4	.329	.666	.664	.496	.786	.867	.363	.739	.676	.552	.865	.872
Full Equation	.465	.675	.669	.521	.827	.882	.492	.744	.686	.574	.878	.899

a,b,c: See notes to Table 11.

TABLE 13: SOCIOECONOMIC ACHIEVEMENT IN THE NIXONOMICS AND WATERGATE COHORTS: NET METRIC REGRESSION COEFFICIENTS FOR 1969-71 AND 1972-73 ENTRANTS TO THE U.S. CIVIL SERVICE[a]

Cohort:	Nixonomics (1969-71)				Watergate (1972-73)			
Dependent Variable:	Occupation		Salary (\$100)		Occupation		Salary (\$100)	
Date of Dep. Var.:	Entry	1977	Entry	1977	Entry	1977	Entry	1977
Independent Variable								
Education	2.47***	0.74***	5.22***	3.28***	1.79***	0.72***	4.38***	2.86***
Entry Age	0.51$^{\#}$	0.09	1.70$^{\#}$	- 0.25	0.69*	0.22	1.17	2.38**
Entry Age^2 (100s)	-0.67	-0.18	- 0.78	0.25	- 1.00*	-0.36	- 0.45	- 3.67**
Seniority	—	-0.02	—	0.49***	—	0.04	—	0.75***
Minority	-2.25**	-0.69	- 1.82	1.03	- 1.41*	-0.62	- 5.51*	- 1.39
Female	-3.40***	-1.50$^{\#}$	-11.74***	-20.49***	- 2.61***	-0.92	- 8.03**	- 7.99***
Blue-Collar Entry	-9.62***	6.04***	1.65	- 0.23	-15.71***	9.96***	27.52***	- 1.26
Disabled Veteran	-4.03*	0.32	- 7.23	1.33	- 2.12	-0.40	- 1.47	9.18$^{\#}$
Other Vet. Pref.	-0.71	-0.60	5.34$^{\#}$	7.31*	- 1.70*	-0.25	3.19	0.28
Defense/State[b]	2.76***	-0.13	5.26$^{\#}$	-20.23***	0.71	-1.50*	- 1.91	-12.08***
Postal[b]	-0.78	-3.06***	9.78**	-11.46***	- 1.18	-2.53***	29.22***	-10.78***
V.A.[b]	0.75	2.23*	- 1.77	-16.97***	1.66	-0.47	- 4.23	-12.45***
H.E.W./H.U.D.[b]	-1.89	-1.26	15.86***	0.79	- 1.40	-0.79	1.42	- 0.13
D.C., Entry	1.33	-1.52	7.17*	- 7.75	0.56	0.64	11.33***	7.95$^{\#}$
D.C., 1977	—	1.50	—	23.96***	—	-0.91	—	- 2.98
Occupation, Entry	—	0.51***	1.46***	0.27	—	0.67***	1.41***	0.26$^{\#}$
Occupation, 1977	—	—	—	0.31$^{\#}$	—	—	—	0.78***
Salary, Entry (\$100)	—	0.03***	—	0.86***	—	0.01	—	0.82***
Constant	-0.56	10.43*	-95.71***	-48.05**	7.87$^{\#}$	1.63	-72.88***	-78.06***
R^2 Values[c]								
Equation 1	.417	.401	.447	.446	.269	.330	.257	.390
Equation 2	—	.591	.546	.734	—	.612	.329	.776
Equation 3	—	.590	—	.742	—	.613	—	.790
Equation 4	.439	.590	.571	.771	.274	.614	.391	.793
Full Equation	.484	.622	.588	.806	.352	.648	.494	.808

a,b,c: See notes to Table 11.

required experience, with a year of college generally taken as the equivalent of nine months of experience, and a year of graduate study equated to a year of experience (Couturier, et al., 1979:223).

The effects of age are also consistent with a human capital interpretation, though again other explanations are possible. Age at entry, a rough proxy for potential prior experience in the labor force, brings positive socioeconomic returns in all cohorts, especially with respect to salary. The quadratic term, square of age, is in general negatively associated with socioeconomic achievement, as predicted by a hypothesis of decay or obsolescence of human capital acquired through experience. Even more markedly than education, the direct effects of age appear to operate primarily at entry, a possible reflection of "orderly" careers, in the sense defined by Spilerman (1977). That is, in comparison to external labor market findings (see Kelley, 1973), later achievement is quite rigidly determined by prior occupation and salary in the Federal government, and correspondingly less subject to the direct influences of other employee characteristics. Still, the sample includes only employees with substantially continuous Federal careers, and hence may be biased toward orderliness.

On first inspection, the effect of seniority also seems to conform to a human capital interpretation. Within each cohort, variations in seniority measure differences in precise dates of entry and in time lost to discontinuities in service. In accord with the view that seniority represents organization-specific, on-the-job learning, each month of seniority brings a net salary increment in the first years after entry, amounting to about $25 for the Long-term, Great Society, and Vietnam cohorts, and about $50 and $75 for the Nixonomics and Watergate cohorts, respectively. However, seniority has little or no influence on occupational prestige, and in the three earliest cohorts, in which the model includes a third point in the career cycle, the effect of seniority on 1977 salary is entirely mediated by 1970 salary. Furthermore, preliminary analyses showed that the square of seniority is a consistently insignificant predictor of both occupation and salary in all cohorts (leading to its deletion from the model).

For these reasons, we interpret the influence of seniority on salary, not primarily as a return to human capital, but as a result of administrative practices that institutionalize seniority per se as a basis of remuneration (cf. Medoff and Abraham, 1979). The seniority steps built into white-collar Federal pay schedules become more widely spaced with longer time in grade, and the prescribed minimum time between grade promotions is greater beyond the lowest grades. These two administrative features of the Federal pay system probably account for the trivial direct effect of seniority on salary in the later career for the Longterm, Great Society, and Vietnam cohorts. Also, the larger returns to seniority in the two most recent cohorts support the common opinion that promotions and step increases are now treated as more automatic than formerly; i.e., as compensation for time in grade rather than for exemplary performance.

The effects of minority group and sex. We refer to the additive effects of minority group and sex, net of the other variables in the model, as primarily indicative of discrimination, although alternative explanations (e.g., possible differences in previous employment history) are not altogether ruled out by the available data. Interaction effects involving race and sex (cf. Featherman and Hauser, 1976a, b) are not examined here, but will be considered in subsequent analyses to this report.

Much of the discrepancy in socioeconomic achievement between minority and non-minority Federal employees can be traced to occupation at entry, where minority entrants consistently score about 2 prestige points lower. This difference probably represents a combination of both occupational stereotyping by race in the external labor market, and discrimination in the placement of entrants within the Federal government itself. At least since 1963, there appears to have been little racial discrimination in occupational achievement after entry into the Federal service. Net of prior occupation, the estimated effect of minority status is generally negative but very weak; only one of the eight relevant coefficients differs significantly from zero.

Salary differences present another pattern. The Great Society and Vietnam cohorts show essentially no discrimination against minorities with respect to salary at entry, nor any significant net salary differentials by 1970. The explanation might be sought in the vigor of the civil rights movement during the period, in selective recruitment and retention of exceptionally qualified or motivated minority employees, in President Kennedy's 1962 Executive Order establishing "affirmative action" in the Federal service, or in a spillover effect from economic prosperity and growth in the Federal labor force. Yet whatever the precise mix of these historical factors (cf. Burstein, 1979), the apparent equality of opportunity by race experienced by employees who entered the Federal service during the 1960s is in sharp contrast to the experience of the Longterm cohort, and to the salary differentials between minority and non-minority civil servants which are evident in cross-sectional analyses (e.g., Smith, 1976; Taylor, 1979).

Unfortunately, this sanguine conclusion does not apply to the period since 1970. As the tables show, minority employees' entering salaries in the two most recent cohorts were $180 and $550 below those of non-minority employees, net of other salary determinants, and the 1977 salaries of minorities in the Longterm, Great Society, and Vietnam cohorts fell behind those of their non-minority coworkers by similar amounts after 1970. The trend is not entirely uniform, and the salary differences mentioned are not all statistically significant, but the direction of the trend is clear enough. When "benign neglect" replaced "affirmative action" as the key to White House racial policy during the Nixon administration (see Morison, et al., 1977), the impact was more than merely semantic.

The direct effect of sex on occupation declines over the career cycle, as does the effect of minority group membership, but the sex coefficients are roughly double the corresponding minority coefficients. Women average 3 to 5 prestige points below men at entry, net of other variables, and another 1 to 3 points lower at the early post-entry career stage. The lower values on these ranges are found in the two most recent cohorts, perhaps suggesting an inter-cohort decline in occupational stereotyping by sex. For the three earlier cohorts, there is essentially no difference between men and women in 1977 occupational prestige, once prior occupation is controlled; i.e., the chances of mobility were equal for males and females in these cohorts after 1970, in part because neither men nor women display much mobility in the later stages of their Federal careers.

On the other hand, the effects of sex on salary are pervasive and cumulative. Controlling for other determinants of salary (including occupational prestige), men command entering salaries $800 to $1300 higher than those of women in all cohorts. At each succeeding stage in the career, the gap widens by an additional $600 to $2000. An optimist might discount the especially large discrepancies in the Nixonomics cohort as due to sampling error or as a political or historical aberration, and if that is done, the remaining analyses do suggest an intercohort decline in salary discrimination, consistent with the preceding results on occupational attainment. The early 1970s saw an increased political awareness of gender-related social issues (see Freeman, 1973), and in particular the establishment of the Federal Women's Program within the U.S. Civil Service Commission. It therefore would not be unreasonable to infer that a period of feminist activism has had some positive effect on women's opportunities for socioeconomic achievement in the Federal government, just as the civil rights movement may have improved the career chances of minorities in the 1960s. However, the salary disparity that remains in 1977 still equals or exceeds the amount by which the gap has narrowed since 1963, and the recent trend for minorities suggests that it will not be narrowed further without continued strong political pressure. The disparity becomes especially striking when it is recalled that the analysis is restricted to men and women employed full time in 1977, with substantially continuous service since entry, and that the accumulated seniority variable acts as a control for remaining male-female differences in career continuity.

On port of entry. Dichotomizing entrants into blue-collar and white-collar permits only a limited representation of Spilerman's (1977) argument regarding entry ports, mobility clusters, and career lines. Yet the degree of disaggregation described by Spilerman, who would identify as many as 10,000 separate career lines, presents severe practical problems even with very large samples (Spenner and Otto, 1979). It also raises a question of theoretical parsimony. The collar-color dichotomy is certainly parsimonious, and appears *a priori* to be a salient criterion for distinguishing entry ports (Collins, 1979). Although the dichotomy is crude, its influence on career success might be considerable.

As it turns out, Tables 12 and 13 indicate that blue-collar entry is no great handicap to long-run success in the white-collar Federal service, for those who do cross the barrier between blue-collar and white-collar work. Not surprisingly, the occupational prestige of blue-collar entrants is, at entry, substantially below that of their white-collar counterparts. Given the inclusion in the analysis of only those blue-collar entrants who later achieved white-collar jobs, it is equally unsurprising that they display above-average upward mobility at each subsequent stage in the career. Net of their lower entering prestige, the blue-collar entrants received above-average starting salaries, especially in the most recent cohort. However, in none of the cohorts entering the Federal service since 1963 is there much difference between the eventual salaries of blue-collar and white-collar entrants, once entry salary is controlled. The net effect of blue-collar entry on later salary is negative, but never approaches statistical significance. The information on the Longterm cohort in Table 11 suggests that those who make the switch to white-collar work well along in their careers do suffer a short-term salary disadvantage, but even for them long-run direct effect of earlier blue-collar work on 1977 salary is essentially nil.

The cumulative effects of occupation and salary. Occupational prestige at any point in the career is strongly dependent upon occupation in the preceding stage, an effect which is quite similar in magnitude across all cohorts. A weaker but statistically significant lagged effect, also positive, links earliest occupation with 1977 occupation in the three cohorts in which the lag can be tested. Thus, the chance of upward mobility in mid-career is greater for those who entered in higher prestige occupations, net of all other variables in the model. Although this result could be an artifact of measurement error (see Kelley, 1973), it may also indicate a continuing effect of entry port on career lines in a BLM.

No consistent lagged effect is evident in the determination of salary by earlier salary. As with occupation, the direct link between salaries at successive points in the career is uniformly strong and positive, an apparent expression of orderliness in the Federal career. Salary is also strongly affected by contemporaneous occupation, as hypothesized. Lagged effects of occupation on salary, and vice versa, are negligible.

Discussion on Promotions

By way of summarizing the varied and complex findings reported here, we should note that our results clearly document the importance of entry ports and career lines as structural features of the Federal labor market, and at least suggest their importance for other BLMs as well. For example, the effects of employment in the Veterans Administration reflect the presence in that agency of a group of seemingly disparate career lines which have in common restricted opportunities for salary increases after entry. Similarly, the Postal Service displays a distinctive pattern of earnings over the career cycle. Or consider the earnings trajectory associated with a career that begins in the field but ends with an assignment in the national capital. Finally, though entering Federal employment through a blue-collar port has little enduring effect on the careers of those who then shift to white-collar work, both entry occupational prestige and starting salary are powerful predictors of subsequent achievement. In short, an emphasis on the career lines associated with different ports of entry, both occupational and organizational, is no small contribution to our understanding of careers.

Still, the career-line perspective apparently errs in its assertion that "our implicit model of education and attainment...applies much less readily to the...civil service world...with formal job structures and internal promotion systems" (Kaysen, 1973:149). Education, age, and occupation in the external labor market are by no means irrelevant to success within the BLM, and int generational influences on socioeconomic achievement in the Federal service do not differ markedly from those observed in non-BLM samples. Nor do the effects of minority status and sex operate exclusively through differential access to advantageous entry ports and career lines. As just noted, starting salary and entry occupational prestige, the blue-collar entry dichotomy, and even geographic location and agency are all associated in varying degrees with the characteristics making a given entry port better or worse for subsequent career success. The race and sex differences in salary which remain after such variables are controlled almost certainly reflect more than just differential access to career lines, and probably involve some direct discrimination in administrative decisions about employee remuneration.

Only one of the two hypotheses that introduced this section is strongly supported by the results reported. With organizational rank operationalized in terms of salary, the determinants of salary at mid-career, net of earlier salary, can be interpreted as determinants of promotions. Thus the consistently significant net effect of education confirms H (7). The effects of the linear and quadratic terms for age are generally of opposite sign, as would be expected under H (8), which proposes a decline in promotions with increasing age after forty. However, in only one cohort (1972-73) are the effects on salary, net of earlier salary, both significant. Nor is there any clear indication that age forty is consistently the inflection point for the curvilinear age - salary relationship.

This section has also provided some preliminary evidence on Objective (1), concerning which entry occupations lead to subsequent mobility. We have seen that blue-collar entry is no great handicap to subsequent salary mobility, and that occupational prestige mobility may be somewhat more likely for employees whose entry occupations are above average in prestige. We provide additional information on this objective with a different analytical approach in the section on career ladders, below.

Turnover. First, however, we direct our attention to answering a few limited questions about turnover in employment. People who leave positions in the Federal government are experiencing mobility of a sort, and at the same time they influence the mobility prospects of those who remain. Specifically, we hypothesized that,

H (9) With grade controlled, years of schooling will be positively associated with turnover.

H (10) Net of grade and job series, there will be no significant difference by sex in turnover.

H (11) Length of potential promotion ladder will be negatively associated with turnover.

From our Federal Careers File, we selected two subsamples of employees: those entering Federal employment at any time between 1963 and 1973, and those entering prior to 1963, but still on-board in June, 1965. The entrant subsample spans the Great Society through Watergate cohorts of our earlier analysis, while the mid-career subsample corresponds to the long-term cohort. Because we are interested in turnover, we do not restrict these subsamples to employees still on-board in 1977 as in the cohort analysis. However, we do require that the employees remain on-board for at least three years, since our concern is with turnover among those who would be thought of as "career" civil servants. For consistency with a later analysis of the effects of job attributes on mobility, including turnover, we also restrict the subsamples to employees whose jobs at entry (or in 1965) are among those for which attribute scores are available from the Factor Evaluation System -- over half of the Federal white collar work force.

Table 14 reports regression results predicting turnover from education

TABLE 14. EFFECTS OF EDUCATION, MINORITY/SEX GROUP AND OCCUPATIONAL CATEGORY ON TERMINATION FOR ENTRANTS AND MID-CAREER CIVIL SERVANTS[a]

	ENTRANTS[b]	MID-CAREER[c]
Education	-.004	-.012*
Non-Minority Female	.095***	.019
Minority Male	.038	-.042
Minority Female	.016	-.010
Professional	.082#	-.004
Administrative	.061	.008
Technical	.052#	.045
R^2	.030	.067

[a] Values in the table are metric regression coefficients predicting a dichotomous variable scored 0 if the employee was still employed in June, 1977 and scored 1 if not. Effects are net of the other variables in the table, plus age, square of age, veteran status (two dummy variables), agency (three dummies), competitive appointment, D.C. assignment, and point score on four job attributes (knowledge, contacts, communication, and requirements) used under the Factor Evaluation System for assigning grade level. R^2 values have been adjusted for degrees of freedom.

[b] Employees who entered FES-scored jobs between 1963 and 1973, who were less than 50 years of age at entry, and who remained on-board at least three years after entry. N=2469.

[c] Employees who entered before 1963, who were in FES-scored jobs in June, 1965, who were 50 years of age or less in 1963, and who remained on-board at least three years after the personnel action recording their 1965 job. N=2096.

minority/sex group, and occupational category, net of our usual controls. (Grade level is controlled indirectly by including attribute scores from FES, multicollinearity between these scores and grade being so high that a direct control for grade is superfluous.) The results from Table 14 do not lend much, if any, support to H (9) through H (11). For entrants, education is not associated with turnover; for mid-careerists, however, education has a weak negative effect, contrary to H (9)

With regard to minority/sex group and turnover, we find that non-minority women have nearly a ten percentage point higher turnover rate than non-minority men in the entrant subsample. This result contradicts our expectation under H (10), although the same comparison among the mid-careerists conforms to our expectation of no significant difference by sex, as do the results for minority men and women in both subsamples. Thus, for non-minority women the period of high transience immediately after entry seems to last longer than the three years we have taken as defining "career" civil servants. Later in their careers, however, their attachment to Federal employment is not significantly less than that of non-minority males. For both entrants and mid-careerists, minority women are as firmly attached as either minority or non-minority men.

Testing H (11) requires an operationalization of "length of potential promotion ladder." After entertaining several alternatives, we used the rather broad groupings of occupational category (PATCO). Administrative occupations span the grade hierarchy from mid-level through the top of the supergrades, and professional occupations span almost as great a range. Technical occupations are more restricted, and clerical occupations cover the narrowest range of all. Under H (11), then, this sequence of occupational categories should correspond to a ranking of turnover rates from lowest to highest. However, the results in Table 14 do not support that expectation. If anything, clerical workers have somewhat lower turnover rates than the other groups. Given our crude measure of promotion potential, we caution against overinterpreting this finding.

OCCUPATIONAL CAREER LADDERS

In this section we will address four related objectives:

O (1) What are those entry occupations which lead to subsequent mobility?

O (2) What clusters of occupations make up career patterns in that channels of occupational change appear to be established?

O (3) What occupations provide the ability to "bridge" the major occupational groups?

O (4) What are those skills and abilities required to progress through career lines such as those derived from Objectives 1, 2 and 3?

The first of these objectives has already been considered above, using the multiple regression approach standard to status attainment research. Here we rely mainly on the other technique most common to mobility studies, cross-tabulation. The analysis examines mobility from 1969 to 1977 for a cross-section of Federal employees on-board in 1973, drawn from our Federal Careers File. White-collar occupations are grouped into the official OPM categories used earlier - Professional, Administrative, Technical, Clerical and Other (PATCO). To determine the extent of movement between white-collar and blue-collar jobs, we include blue-collar workers in this part of our analysis, although they have generally been excluded from our other analyses. The blue-collar classification into Premium Skilled, Skilled, Semi-Skilled and Unskilled occupations, which was developed but never officially adopted by OPM, is used here as the best available classification for our purposes.

To simplify the discussion, we present not the raw mobility matrix itself, but the standardized lambda parameters from a log-linear analysis of the raw table using Goodman's ECTA. These effects take into account the fact that the categories differ in size. Positive values indicate cells that include an overrepresentation of employees, while negative values indicate an underrepresentation. Standardized values greater than 2 in absolute magnitude indicate that the over- or underrepresentation is statistically significant beyond the .05 level.

Table 15 reports the results. The most striking finding is the concentration of large positive effects on the main diagonal. Most Federal employees do not change occupational categories. Indeed, among those on-board in both 1969 and 1977, fewer than 20 percent were in different categories in the two years. To be sure, this understates the total mobility. Some employees changed categories more than once, and a few of these had returned to their 1969 categories by 1977. Further, our categories are quite broad, and hence mask mobility between detailed occupations within major categories. For the full 1973 cross-section, 29 percent had at least one change of detailed occupation between 1973 and 1977, and 9 percent had at least two such changes over those years. Finally, there is a substantial amount of mobility out of the Federal government altogether. Over a quarter of those employed in both 1969 and 1973 had left the government by 1977, while nearly half of those entering between 1969 and 1973 were gone by 1977. Still, the obvious conclusion from Table 15 is that most Federal careers are confined within broad occupational categories.

Occupational shifts that do occur take place largely within the blue-collar/white-collar groupings indicated by the dashed lines in Table 15. Among the white-collar occupations, for example, the professional and administrator categories feed each other employees, while the technical workers transfer into both the professional and administrative categories. Clerical workers, on the other hand, appear barred from entry into the professional occupations, but are able to move into both the administrative and technical groups. In no case were white-collar workers likely to move into any of the blue-collar occupational groups.

Among the blue-collar workers, there is a greater amount of what might be considered downward movement than among white-collar workers. For example, premium skilled workers are fairly likely to move into the lower category of blue-collar work (skilled workers), and the skilled workers themselves show a

Table 15: A Log-Linear Analysis of Occupational Mobility, 1969-1977: Standardized Lambdas[a]

	Occupational Group, 1977									
Occupational Group, 1969	Professional	Administrative	Technical	Clerical	Other	Premium Skilled	Skilled	Semi-Skilled	Unskilled	Leavers
Professional	18.35	6.73	- 2.11	- 2.67	0.87	- 0.87	- 2.29	- 1.62	- 1.04	5.81
Administrative	2.23	22.48	0.80	2.48	- 1.04	- 0.87	- 3.39	- 2.70	- 2.11	4.60
Technical	3.15	6.69	21.04	0.99	- 2.43	- 1.52	- 3.72	- 2.62	- 0.15	0.62
Clerical	- 5.47	4.23	8.95	30.08	- 1.88	- 3.32	- 4.82	- 1.64	- 2.35	4.19
Other	2.18	1.87	- 2.85	- 3.32	16.80	- 0.82	- 2.73	- 0.66	- 0.65	- 5.87
Premium Skilled	- 2.10	- 2.56	2.78	- 2.65	- 0.09	14.94	6.11	- 1.70	- 1.11	- 1.53
Skilled	- 6.89	- 9.60	- 6.17	- 7.15	- 2.29	7.17	17.71	5.72	2.17	- 7.14
Semi-Skilled	- 4.89	- 7.08	- 1.89	- 1.93	- 1.71	- 0.17	7.66	16.56	2.24	- 2.13
Unskilled	- 2.94	- 5.30	- 4.34	0.01	0.87	- 1.51	3.87	6.64	14.64	- 1.54
Entrants	3.72	- 7.41	- 3.42	10.35	1.26	- 0.89	- 0.91	0.60	- 0.05	- 8.73

a: N=28,690

large chance of movement not only into the premium skilled group, but also into the semi-skilled and unskilled groups. Similar is the situation for the semi-skilled and unskilled groups.

In the main, the patterns of mobility displayed in the 1969-77 table are similar to those apparent over the four-year periods, 1969-73 and 1973-77. We therefore omit these results here. The three-way table, 1969-73-77, includes 900 cells and thus defies parsimonious discussion. Since many of the cells are empty, signifying rare mobility histories, log-linear analysis is problematic. To indicate in general terms the kinds of mobility patterns revealed in the three-way tables, we present (in Table 16) the 1973-77 mobility of employees who in 1969 were in the largest major category, the clerical workers. (We are grateful to Amy Aldred for compiling this table.)

The table shows, first, that there is little return mobility. That is, only 1 percent of employees who were clericals in both 1969 and 1977 were administrators or technicians in the interim. Second, it shows that there are two routes from clerical into administrative jobs. Most who make that shift appear to do so directly, whether between 1969 and 1973 or between 1973 and 1977. Still, nearly 10 percent occupied technical jobs as a "bridge" between their 1969 clerical and 1977 administrative positions.

Because of the relatively small numbers of employees who change major occupational categories, direct identification of the detailed occupations which might serve as bridges between categories is not feasible. Instead, our analysis of Objective (3) focuses on the job attributes that appear to promote such bridging. In turn, the analysis of job attributes provides clues to the skills and abilities associated with mobility in the Federal service--our Objective (4). That is, by determining the attributes of jobs that are associated with occupational change, we hope to shed light, albeit indirectly, on the types of abilities that education for career preparation might seek to develop.

The job attribute measures used are taken from the Federal government's new Factor Evaluation System (FES) of position classification. When FES is fully implemented, every occupation in the General Schedule pay system will have grade levels assigned according to scores on the nine job factors defined in Table 17. These nine factors are: (1) Knowledge required by the job; (2) Supervisory control; (3) Guidelines; (4) Complexity; (5) Scope and effect; (6) Contacts; (7) Purpose; (8) Physical requirements; and (9) Work environment. We have obtained the factor scores for nearly 500 occupation/grade combinations, which include over half of all General Schedule employees. We relied on official published scores whenever possible, but also used, where necessary, draft scores still under review and trial scores from early field tests of FES. Where more than one score is published for a given factor on a single occupation/grade combination (in FES jargon, when a job has more than one "benchmark" or typical combination of duties), we took the simple arithmetic average as our best approximation.

We report separate analyses for the two subsamples whose turnover was

Table 16. Selected 1973 and 1977 Occupational Categories of 1969 Clerical Employees (Percents)

	1977				
1973	A	T	C	L	Total
A	41.2	1.7	.4	1.7	(220)
T	9.7	35.6	.6	3.8	(314)
C	49.0	62.7	99.0	94.5	(7236)
Total	99.9 (383)	100.0 (464)	100.0 (5276)	100.0 (2043)	(8166)

TABLE 17 FACTORS IN THE FACTOR EVALUATION SYSTEM[a]

Factor/Subfactor	Definition
Knowledge Required	The nature and extent of information or facts which the worker must understand to do acceptable work (e.g., steps, procedures, practices, rules, policies, theory, principles, and concepts) and the nature and extent of skills/abilities necessary to apply these knowledges.
Responsibility	
[Lack of] Supervisory Controls	The nature and extent of direct or indirect controls exercised by the supervisor, the employee's responsibility, and the review of completed work.
[Lack of] Guidelines	The nature of guidelines and the judgment needed to apply these guidelines. Jobs vary in the specificity, applicability, and availability of guidelines for performance of assignments.
Difficulty	
Complexity	The nature, variety, and intricacy of the work performed; the breadth, depth, or extent of tasks or projects assigned; the related or conflicting information, programs, or concepts.
Scope and Effect	The purpose of assignments; the nature of the cases, questions, and problems involved; and the effect of the completed work both within and outside of the organization.
Personal Relationships	
Personal Contacts	Ranges from contacts with other employees in the immediate work unit ... to contacts with high-ranking officials outside the agency.
Purpose [of Contacts]	[Ranges from contacts] to obtain, clarify, or give facts or information directly related to the work [to contacts] to justify, defend, negotiate, or settle matters involving significant or controversial issues.
Environmental Demands	
Physical Requirements	The requirements and physical demands placed on the employee by the work assignment. This includes physical characteristics and abilities (e.g., specific eyesight and dexterity requirements) and the physical exertion involved in the work.
Work Environment	The risks, discomforts or unpleasantness that may be imposed upon employees by various physical surroundings or job situations.

[a] Source: Verbatim, except for bracketed inserts, from Personnel Research and Development Center (1973:77,79,82,84,86,88,90-92).

examined earlier: entrants between 1963 and 1973, and mid-careerists as of 1965. The first part of the analysis involves the computation of what we term "continuity coefficients." These relate the attributes of an employee's job at entry (or in 1965 for the mid-careerists) to the same attribute in 1977 or at termination. The size of the correlation thus gives the degree of continuity in that attribute. The attributes were scored in two ways for this analysis. The "raw" scores are simply the nine FES factor scores for the employee's occupation and grade. In addition, we have generated what we call "profile" scores, obtained by (1) converting all nine of the factors to a common metric, using Z-scores plus the constant 10 to insure positive values; (2) summing the nine factors in the new metric; and (3) expressing each factor in the new metric as a percentage of the total score on all nine. The resulting profile scores give the relative predominance of any one factor compared with all the others, rather than its absolute magnitude, and thus are more informative for some purposes. In particular, they reduce the autocorrelation between attributes at successive times. Also, multicollinearity between the profile scores and GS grade is less pronounced than is true of the raw scores.

Table 18 shows a high degree of continuity on all attributes for the average Federal employee over the early career, though typically more so for the raw scores than for the profiles. Pairs of raw scores at successive times share from half to three-quarters of their variance; pairs of profiles share a quarter to half. Similar conclusions hold when we look only at employees who in any way change jobs (either occupation or grade, or both). However, about half of the latter group did in fact change occupations when they changed jobs, and for these employees the continuity coefficients are considerably less. The raw scores share only a tenth to a quarter of their variance, and the profiles at most a tenth. Using the profiles as a guide, the continuity between entry job and later job, for those who change occupations, is greatest with respect to knowledge, responsibility (absence of supervision), personal contacts, physical demands (including manual skills), and environmental conditions. If we look at employees who not only change their detailed occupational series, but also move between major occupational groups, we see even less continuity. Again using the profile scores, only knowledge and physical demands yield significant correlations.

In Table 19 the analysis is repeated for the mid-careerists. The pattern of findings is generally similar, but there is substantially greater continuity. Thus mobility in the early career appears more random than later in the career, in that it tends to involve less similar occupations.

Among the entrants, especially, the attributes that display the greatest continuity are knowledge and physical requirements. This is a finding of no small import, for it is precisely these two attributes which seem most directly related to trainable abilities of individuals--general command of a subject-matter, on the one hand, and specific technical skills, on the other.

The foregoing results speak to the question of what attributes an origin and destination job tend to have in common, given that mobility occurs.

Table 18

Continuity Coefficients for Raw Scores and Profile Scores on Nine Job Attributes, by Mobility: Entrants to the U.S. Civil Service, 1963-1973[a]

Attribute	All Employees[b]		Job Changers[c]		Series Changers[d]		Group Changers[e]		Category Changers[f]	
	Raw	Profile	Raw	Profile	Raw	Profile	Raw	Profile	Raw	Profile
Knowledge	.872	.683	.852	.595	.533	.112	.503	.166	.410	.169**
Supervision	.702	.509	.658	.417	.368	.175	.339	.082ⁿ	.377	.180**
Guidelines	.760	.574	.714	.435	.387	.067*	.358	.038ⁿ	.375	.100ⁿ
Complexity	.794	.565	.763	.430	.396	-.016ⁿ	.389	-.027ⁿ	.284	.092ⁿ
Scope	.809	.582	.786	.462	.484	.096**	.399	.037ⁿ	.357	.078ⁿ
Contacts	.731	.555	.680	.438	.344	.130	.130**	-.047ⁿ	.347	.170**
Communication	.714	.480	.654	.332	.304	.077**	.272	-.018ⁿ	.386	.080ⁿ
Requirements	.771	.781	.710	.729	.281	.310	.105*	.188	.266	.323
Environment	.766	.768	.724	.718	.318	.221	.036ⁿ	.038ⁿ	.320	.323
N	2262	2262	1834	1834	923	923	367	367	202	202

a: Values in the table are Pearson (product-moment) correlation coefficients between each job attribute at entry and the same attribute as of June, 1977 (or at termination). All coefficients are significant at the .001 level (one-tailed test), except as follows: **, .01; *, .05; n, not significant.

b: Employees who entered between 1963 and 1973 and who were in scored jobs at entry and in June, 1977 (or at termination). Employees who terminated less than three years after the personnel action recording their entry job or older than 50 at entry are excluded.

c: A subset of the employees described in note b, who changed either grade level or occupational series (four-digit code) between the two time points.

d: A subset of the employees described in note c, who changed occupational series.

e: A subset of the employees described in note d, who changed occupational group (two digit code).

f: A subset of the employees described in note c, who changed occupational category (one-digit PATCO code).

Table 13

Continuity Coefficients for Raw Scores and Profile Scores on Nine Job Attributes, by Mobility: Mid-Career U.S. Civil Servants, 1965[a]

Attribute	All Employees[b]		Job Changers[c]		Series Changers[d]		Group Changers[e]		Category Changers[f]	
	Raw	Profile	Raw	Profile	Raw	Profile	Raw	Profile	Raw	Profile
Knowledge	.900	.761	.874	.617	.751	.311	.694	.338	.522	.221**
Supervision	.779	.598	.708	.406	.558	.116**	.499	.042^{n}	.370	.209**
Guidelines	.830	.649	.754	.426	.682	.184	.610	.142*	.451	.192**
Complexity	.832	.682	.769	.460	.682	.175	.648	.186**	.516	.221**
Scope	.846	.664	.802	.447	.720	.343	.671	.283	.526	.309
Contacts	.736	.594	.598	.368	.475	.166	.362	.070^{n}	.287	.147*
Communication	.774	.599	.667	.340	.499	.095*	.448	.004^{n}	.292	.007^{n}
Requirements	.851	.872	.762	.814	.403	.520	.136*	.437	.605	.560
Environment	.841	.848	.740	.764	.309	.349	.074^{n}	.183**	.272	.159*
N	1729	1729	1164	1164	511	511	218	218	172	172

a: Values in the table are Pearson (product-moment) correlation coefficients between each job attribute in 1965 and the same attribute as of June 1977 (or at termination). All coefficients are significant at the .001 level (one-tailed test), except as follows: **; .01; *; .05; n, not significant.

b: Employees who entered before 1963 and who were in scored jobs in June, 1965, and in June, 1977 (or at termination). Employees who terminated less than three years after the personnel action recording their 1965 job or older than 50 in 1963 are excluded.

c: A subset of the employees described in note b, who changed either grade level or occupational series (four-digit code) between the two time points.

d: A subset of the employees described in note c, who changed occupational series.

e: A subset of the employees described in note d, who changed occupational group (two-digit code).

f: A subset of the employees described in note c, who changed occupational category (one-digit PATCO code).

Another way to approach the issue of skill transferability using the job attribute data available to us is to ask what attributes of an origin job are most conducive to subsequent mobility.

Results bearing on this question are reported in Tables 20 and 21 for the entrant and mid-career subsamples, respectively. Taking each of nine different kinds of mobility as the dependent variable in a regression equation, we examine the effects of four of our job attributes, net of the usual controls. Multicollinearity prevented us from simultaneously examining the effects of all nine FES factors, so we selected the two with the greatest continuities in the previous analysis -- knowledge and physical requirements -- plus two that seem especially likely to improve an employee's chances for mobility -- contacts and communications with a network of other government and non-government workers in the course of the job. For simplicity, we use ordinary least squares regression techniques to estimate the effects although there are more sophisticated methods available for dichotomous dependent variables.

The tables indicate that none of the four job attributes we selected for study has much effect on most kinds of mobility. Looking first at the effects of the raw scores, we see that employees scoring higher on knowledge, communication, and to some extent physical requirements are less likely to change grades. This may be because grade promotions (by far the most common grade change) are less frequent at higher levels. Those scoring high on knowledge are also somewhat less likely than others to have a temporary break in their Federal employment. The last result holds for the profile scores as well, but the negative effects of the raw scores on grade change become positive when the profile scores are used. This suggests that jobs which are relatively high on knowledge or physical requirements do provide their incumbents with transferable skills that can be used to climb the grade hierarchy, but that this effect is masked in the raw score analysis by the effect of grade *per se*. For none of the other types of mobility examined are there strong and consistent effects, either positive or negative, from the job attributes considered in the tables.

Summary and Conclusions

Hypotheses and objectives. Where previous theory and research allowed us to assert specific, determinant hypotheses in our original proposal to NIE, our results can be summarized simply by reiterating the degree of support we have found for each hypothesis in our Federal careers data. The reader should of course refer to the body of our report for qualifications and reservations concerning the findings so baldly stated here. Thus:

H(1). Years of schooling and amount of experience will be positively associated with salary. *Supported.*

H(2). The associations in H(1) will be stronger for white males than for non-white males and females. *Ambiguous*; supported in cross-sectional but not in cohort analysis.

H(3). The highest returns to schooling will be for those

TABLE 20. EFFECTS OF SELECTED JOB ATTRIBUTES (RAW SCORES AND PROFILE SCORES) ON MOBILITY: ENTRANTS TO THE U.S. CIVIL SERVICE, 1963-1973[a]

		Raw Scores					Profile Scores				
Dependent Variable	(Mean)	Knowledge	Contacts	Communication	Requirements	R^2	Knowledge	Contacts	Communication	Requirements	R^2
Geographic Move	(.448)	.008	.072*	-.048	-.029	.109	-.020	.029	-.035	-.048#	.109
Agency Shift	(.261)	-.071	-.001	.007	-.053*	.124	-.005	.001	.003	-.039	.123
Job Change	(.886)	-.278***	.013	-.171***	-.045#	.137	.078*	.049*	-.065**	.096***	.111
Grade Change	(.856)	-.354***	.010	-.169***	-.053*	.143	.099**	.065**	-.049*	.128***	.110
Series Change	(.572)	-.041	-.033	.008	-.049*	.295	-.003	-.022	-.004	-.040	.294
Group Change	(.260)	-.030	-.024	-.029	-.021	.105	.045	.005	-.005	.022	.104
Category Change	(.193)	-.031	.012	.039	-.023	.133	-.018	.004	.017	-.029	.133
Break in Service	(.282)	-.191***	.020	.027	.050*	.149	-.095**	-.001	-.000	.051#	.149
Termination	(.148)	-.015	-.002	-.060#	.056*	.030	.038	.007	-.012	.083**	.022

[a] Values in the table are standardized partial regression coefficients predicting the indicated dependent variable from each of four attributes of the employee's entry jobs net of the other three attributes and the following control variables: education, age, square of age, veteran status (two dummy variables), minority/sex group (three dummies), agency (three dummies), occupational category (three dummies), competitive appointment, and D.C. assignment. For all dependent variables except termination, months at risk of mobility (entry date to termination date) is also controlled. Dependent variables are dichotomies scored 1 if the employee experienced a given type of mobility at least once between entry and June, 1977 (or termination); scored 0 otherwise. See notes to Table 4- for definitions of job, series, group, and category changes. Significance levels are reported as follows: ***, $p < .001$; **, $p < .01$; *, $p < .05$; #, $p < .05$ one-tailed. R^2 values have been adjusted for degrees of freedom. N = 2469 employees entering a scored job between 1963 and 1973. Employees who terminated less than three years after the personnel action record- their entry job are excluded, as are those older than 50 at entry.

TABLE 21. EFFECTS OF SELECTED JOB ATTRIBUTES (RAW SCORES AND PROFILE SCORES) ON MOBILITY: MID-CAREER U.S. CIVIL SERVANTS, 1965[a]

		Raw Scores					Profile Scores				
Dependent Variable	(Mean)	Knowledge	Contacts	Communication	Requirements	R^2	Knowledge	Contacts	Communication	Requirements	R^2
Geographic Move	(.469)	-.081	-.014	.024	-.002	.125	.012	.007	.028	.034	.124
Agency Shift	(.297)	-.074	-.033	.015	-.090***	.158	.036	-.007	.020	-.048	.155
Job Change	(.800)	-.290***	-.035	-.066*	-.029	.236	.001	-.006	-.036#	.077*	.217
Grade Change	(.742)	-.303***	-.024	-.078*	-.026	.228	.015	.010	-.037#	.099**	.209
Series Change	(.474)	-.004	-.071*	-.077**	-.093***	.267	.091**	-.027	-.038#	-.031	.261
Group Change	(.222)	-.001	-.039	-.066*	-.082***	.098	.076*	-.004	-.030	-.003	.095
Category Change	(.216)	.030	-.009	-.024	-.093***	.131	.106**	.031	.014	-.041	.133
Break in Service	(.312)	-.135*	-.040	.057#	.024	.173	-.003	-.003	.050*	.084**	.173
Termination	(.209)	.029	-.062	.073*	-.019	.067	.037	-.026	.055*	-.008	.067

[a] See note to Table 20. N=2096 employees who entered before 1963, who were in scored jobs in June, 1965, who were 50 years of age or less in 1963, and who remained on-board at least three years after the personnel action recording their 1965 job.

employees who have high levels of education and high levels of experience. Supported.

H(4). Returns to schooling and to experience will be similar in magnitude. Not supported; returns to schooling greater.

H(5). Controlling for years of schooling and government experience, earned degrees will be positively associated with salary. Supported.

H(6). Duration and expense of job training will be positively associated with years of schooling. Supported, but relationship mediated by occupational stream (PATCO).

H(7). With entry level controlled years of schooling will be positively associated with promotion. Supported.

H(8). With education and grade controlled, there will be a negative association between promotion and age after forty years of age. Weakly supported.

H(9). With grade controlled, years of schooling will be positively associated with turnover. Not supported.

H(10). Net of grade and job series, there will be no significant difference by sex in turnover. Supported for minority employees only.

H(11). Length of potential promotion ladder will be negatively associated with turnover. Not supported.

On the other hand, where our research objectives could only be stated as questions, not as specific hypotheses, our results are more difficult to summarize. As we noted in our proposal to NIE, "lacking the well-integrated foundation of previous theoretical and empirical work which characterizes the literature on human capital and social mobility, the career development portion of our research will be mainly exploratory." One of the more general research questions, dealing with the effects of college major on careers, had to be abandoned altogether because of excessive missing data on the key variable, college major. The remaining questions address the interrelationships among careers, occupational change, and transferable skills, and here we regard our results as suggestive but by no means definitive. Again quoting from our grant proposal, "our over-riding objective throughout this...area of the research [has been] to raise questions no less than to find answers."

Briefly, then, what are the tentative conclusions that we draw from this phase of the project? First, we share the growing conviction that the term career should be defined quite simply as an individual's sequence of jobs over time (cf. Spenner and Oho, 1979). The extent and form of regularity, orderliness, or stability in careers then become topics for investigation rather than matters of definition, as in the traditional usage.

Second, we find that careers in the U.S. civil service are characterized by a high degree of orderliness, in Spilerman's (1977) sense of regular advancement. The amount of mobility between detailed occupations is about as high as in the general labor force (see Sommers and Eck, 1977), but there is relatively little movement across major categories (PATCO). Again like the general labor force (see Blau and Duncan, 1967), there is some movement from blue-collar to white-collar, but very little in the reverse direction.

Third, patterns of occupational change, and career success more generally, appear strongly influenced by the structural characteristics of the Federal government as an internal labor market. We have not isolated specific detailed occupations which are consistently the most advantageous ports of entry or which serve to bridge major occupational categories. However, we have shown the lasting influence that placement at entry can have on the career and have shown further that the relevant characteristics of an entry job are not just its occupational title, but also the geographical and departmental locations of the position within the organization.

Finally, we have sought to address the key question posed in the NIE grant announcement under which our project was funded: "To what extent may a series of jobs held by individuals be related by similarities of skills, abilities or attributes required by the job?" Our answer to this question depends on whether the concern is for the minority of employees who make major occupational changes or for the majority who rarely if ever do so.

If the latter, the degree of continuity in job attributes over time is very high. That result holds whether we consider recent entrants or employees in the middle of their careers, and whether we use the absolute level of each job attribute or a "profile score" giving an attribute's relative preponderance in a job's total tasks.

However, examining major occupational change, we find much less evidence of attribute continuity. Especially for the profile scores of recent entrants, the attributes of jobs tend not to be strongly related over time among employees making a major occupational shift. Nor are the attributes very good predictors of the likelihood of such a shift.

In short, to the extent that skill transferability can be inferred from attribute continuity, such transfer has probably not played a big part in facilitating occupational change for Federal civil servants. Most employees make no major occupational changes; their skills "transfer" because their jobs do not change much. Those who make bigger changes show no strong tendency to move into jobs with similar attributes, where their skills might seem most readily transferred. Indeed, some fraction of them may move in part because they are better suited by skill or temperament to a job with very different attributes.

The job attributes with the highest continuity -- and, by inference, the skills with the greatest transferability -- pertain to the level of knowledge required and the physical demands of the job, including specific technical abilities. This result runs counter to much of the theoretical work on transferability, which argues that more general competencies such as dealing with people are more transferable (e.g., Freedman, *et al.*, 1978). We can suggest two possible interpretations for further research to address. First, it may be precisely the mastery of a specific subject matter or technical skill -- say, tax law or drafting -- that provides the bridge between otherwise dissimilar occupations. For example, a tax lawyer may become an administrator of a tax-related program. Alternatively, it may be that the skill actually being transferred is the ability to learn *per se*. That is, the ability to master a given subject matter or technical skill may itself be a skill that improves with practice, so that even if the content of the knowledge required in a new job is different, a facility at acquiring such knowledge may transfer.

While the mechanism admits of at least these two interpretations, the implications of our finding for educational practice are much the same in either case. *A concern for teaching transferable skills to prepare students for a career of occupational change should not sacrifice thorough mastery of specific subject matters*.

Generalizability. One final question demands attentin before we conclude this report: to what extent can our study of careers in the Federal civil service be generalized to other employment contexts? Although not explicitly formulated as a research objective, that question has been a matter of concern from the outset.

Career research has only recently begun to specify the effects of organizational context on the socioeconomic career. The notion of an internal labor market, discussed in detail by Doeringer and Piore (1971), draws attention to the effects of formal rules and informal customs on organizational careers. Other recent work (see Althauser and Kalleberg, 1977; Beck, *et al.*, 1979; Form and Huber, 1976) documents how different labor markets affect people's work histories in very different ways. Theory and some evidence also suggest that one's location on the various dimensions along which an organization is differentiated can have consequences for career success: the vertical differentiation of authority (Kluegel, 1977), the horizontal line/staff distinction (Pfeffer, 1977), the geographical distribution of an organization's activities (Talbert and Bose, 1977), and differentiation into separate units or departments (Martin and Strauss, 1959). Opportunities for advancement may be greater in the home office, but some experience in the field may be essential preparation for the highest positions in an organization. If the experience is in the largest plant or department, or the one most closely identified with the organization's major product, so much the better.

Organizational labor markets are a heterogeneous lot. Consequently, the effects of organizational context may go unnoticed in a standard human capital or status attainment study, even one which explicitly includes organizational variables. Such studies typically lump workers from diverse organizations in a single analysis, averaging away the effects of context. Recent career research has therefore come to recognize the need for longitudinal case studies of specific organizations, to isolate organizational influences on career success (Kalleberg and Sørensen, 1979).

The project reported here is an application of that strategy; our case, the U.S. civil service. As the nation's largest employer, the Federal civilian labor market is worthy of study in its own right, both because of its direct impact on the nearly three million workers it employs and for its indirect effects, through policy formation and implementation, on the lives of millions more. But civil service careers are also important for what they can reveal, and for what they might suggest, about organizational careers more generally.

Depending on how one counts, from a quarter (Stinchcombe, 1965), to half (Caplow, 1954), to three-quarters (Doeringer and Piore, 1971) of employed Americans work within bureaucratic labor markets. Nearly sixteen percent work for government at all levels, another quarter of the labor force work for businesses with more than 500 employees, and still others are employed by large private universities, hospitals, and the like (Kanter, 1977:15). Of course, the Federal civil service is hardly "representative" of all these diverse organizations. Its size alone makes it atypical, and the absence of a profit orientation is certainly significant. Perhaps most important, Federal personnel regulations have the force of law, and some of these (e.g., the veterans' preference) are peculiar to public employment. But our case study does permit us to isolate the kinds of mechanisms that determine career success in such labor markets, even if the specifics are likely to be more idiosyncratic.

Generalizability is probably greatest from the Federal civil service to the central administrations of other countries, and to state and local governments in the United States. From a review of the available cross-national evidence on civil service careers, Sheriff (1976:54) concludes that "the similarity...across such a diversity of systems is fairly astonishing...It is almost as if there were a 'Weberian myth' of how civil service organizations ought to be run." Simple cultural diffusion explains part of the similarity, since the U.S. has often served as a model for other countries, including even some aspects of public administration in the Soviet Union and Eastern Europe (see Cayer, 1975:147). In turn, the civil service reform movement in America in the late nineteenth century, which established the modern civil service, was heavily influenced by the British and Prussian examples (Shafritz, 1975).

By the same token, most states and the larger local jurisdictions in the U.S. have "merit" employment plans modeled after the Federal personnel system. Initially, the imitation was sincere flattery, but in recent decades it has been in part coerced: Federal statutes increasingly require merit employment practices by state and local agencies handling Federally funded programs (see Meyer and Brown, 1977).

Imitation and coercion explain some resemblances between the Federal civil service and the personnel practices of large private businesses, too. For instance, examinations for job applicants are now among the standard tools of personnel managers in the private sector, but much of the early development of examination techniques was done in the Federal government. The civil service has also led the private sector in reducing employment discrimination by race and sex (see Smith, 1977). Here statutory coercion has probably had more to do with any progress by American businesses than has the government's visibility as a "model employer." The imitation sometimes runs the other direction. For example, the Pay Comparability Act (Public Law 91-656, 1970) pegs Federal salaries to compensation in the private sector; it is one of many Congressional attempts to pattern Federal personnel practices after those in private business.

More abstractly, civil service systems approximate the pure form of bureaucratic administration. "Bureaucracy...is fully developed...only in the modern state, and in the private economy only in the most advanced institutions of capitalism" (Weber, 1968:956). The Federal civil service therefore shares important structural similarities with any other large, bureaucratically organized administrative apparatus (cf. Kanter, 1977). In particular, where bureaucratic "rationality" underlies an organization's personnel practices, the institutions governing the organizational labor market will resemble those in the Federal service. The more bureaucratic an organization, the closer should be the similarities. For a private enterprise, civil service careers should have most in common with careers in the administrative component, which is usually more bureaucratically organized than the production component (Meyer, 1980).

The results already reviewed lend support to these expectations. Our findings with respect to human capital hypotheses, our status attainment analysis, and our estimates of the amount and direction of mobility across occupational lines tend to be consistent, at least in broad outlines, with findings for the general labor force (e.g., Blau and Duncan, 1967; Sommers and Eck, 1977). Like Warner, et al. (1963), we infer that the careers of U.S. civil servants are not greatly different from those of their counterparts in any large private business.

Products and plans. We conclude this report by briefly noting some of our efforts at disseminating the results of our project, as well as the prospects for continuing related work.

To date, this project has generated major articles in the American Sociological Review (Taylor, 1979), and the American Journal of Sociology (Grandjean, 1981), plus a paper in the California Sociologist (by Taylor and Kim). We have presented papers at several professional meetings, including the 1980 American Sociological Association meeting, the 1980 Seminar on Social Stratification of the International Sociological Association and the Conference on Pay Equality (1979). More informally, we have discussed our work with scholars in several universities, and with employees of the Office of Personnel Management. With supplemental funding from the U.S. Department of Labor, we were able to undertake additional analyses and supply that agency with the report included here as Appendix B. Additionally some of our research has been read into the records of Congressional Committee hearings on Equality of Opportunity.

We view both the project and the dissemination of its results as ongoing. We anticipate several additional articles, and perhaps a monograph presenting our results. We have received substantial awards of computer funds from the University of Virginia to continue our analyses, and may seek additional external funding as well. One M.A. thesis based on the project data is nearing completion, a second is in the planning stages, and a Ph.D.

dissertation is well underway. We are optimistic that the present "Final Report" is in fact but an interim report on a long-term program of research on careers in the U.S. civil service.

APPENDIX A:
HYPOTHESES AND OBJECTIVES

I. Human Capital - formal and on-the-job training.

Hypothesis 1. Years of schooling and amount of experience will be positively associated with salary.

Hypothesis 2. The associations in H(1) will be stronger for white males than for non-white males and females.

Hypothesis 3. The highest returns to schooling will be for those employees who have high levels of education and high levels of experience.

Hypothesis 4. Returns to schooling and to experience will be similar in magnitude.

Hypothesis 5. Controlling for years of schooling and government experience, earned degrees will be positively associated with salary.

Hypothesis 6. Duration and expense of job training will be positively associated with years of schooling.

II. Mobility - promotions and turnover.

Hypothesis 7. With entry level controlled, years of schooling will be positively associated with promotion.

Hypothesis 8. With education and grade controlled, there will be a negative association between promotion and age after forty years of age.

Hypothesis 9. With grade controlled, years of schooling will be positively associated with turnover.

Hypothesis 10. Net of grade and job series, there will be no significant difference by sex in turnover.

Hypothesis 11. Length of potential promotion ladder will be negatively associated with turnover.

III. Occupational Career Ladders

Objective 1. What are those entry occupations which lead to subsequent mobility?

Objective 2. What clusters of occupations make up career patterns in that channels or lines of occupational change appear to be established?

Objective 3. What occupations provide the ability to "bridge" the major occupational groups?

Objective 4. What are those skills and abilities required to progress through career lines such as those derived from Objectives 1, 2, and 3?

NOTE: One objective specified in the original proposal to NIE, dealing with returns to education by college major, was not pursued because of excessive missing data on college major, and is therefore omitted from this list. Some of the remaining hypotheses and objectives have been slightly reworded, reflecting a developing conceptualization of the issues as the research progressed, but the major thrust of each is unchanged.

APPENDIX B:
DEPARTMENT OF LABOR FINAL REPORT

Baseline Research on the Operations of the Federal Government Labor Market*
Department of Labor Grant #A20-11-79-32
Extension to National Institute of Education
Grant #78-0005

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*Since grantees conducting research and development projects under Government sponsorship are encouraged to express their own judgment freely, this report does not necessarily represent the official opinion or policy of the National Institute of Education or the Department of Labor, nor any of their personnel. The grantee is solely responsible for the contents of this report. This report may be reproduced, in whole or in part, for use by the Federal government.

Summary

As this nation's largest employer, the Federal civil service occupies an important and visible place in the national labor market. The Federal civil service is visible due to its size and attempt to be regarded as a model employer. It is important not only because of the programs which are administered by Federal civil servants, but also because the personnel practices of the Federal government may have indirect impact on private sector workers and direct impact on state and local government workers.

Given the high interest in and importance of the Federal government as an employer, we prepared an analysis on a limited portion of Federal employment practices. Specifically, we have attempted: (1) to assess the patterns of income inequality by minority/sex group among blue-collar workers; (2) to discover the effect of education and training on the salaries of Federal civil servants; and (3) to compare the patterns of pay structures of minority/sex groups over time.

Using a one percent sample of Federal civilian employee records, we find consistent and considerable salary inequality by minority/sex group for both white-collar and blue-collar workers. Additionally, we find that education, on-the-job experience, and job training have positive effects on the careers of civil servants, although these effects vary by minority/sex status and time in the career.

TABLE OF CONTENTS

Page Number

TITLE PAGE B-1

SUMMARY B-2

TABLE OF CONTENTS B-3

LIST OF TABLES B-4

INTRODUCTION B-5

ORGANIZATION OF THE REPORT B-5

RESEARCH DESIGN AND DATA SET B-6

BLUE-COLLAR WORKERS. B-7

HYPOTHESIS 1 . . . . B-8

HYPOTHESIS 2 . . . . B-10

OBJECTIVE 1 . . . . B-12

TRAINING B-14

HYPOTHESIS 3 . . . . B-14

HYPOTHESIS 4 . . . . B-17

OBJECTIVE 2 . . . . B-20

EQUAL EMPLOYMENT OPPORTUNITY B-22

HYPOTHESIS 5 . . . . B-22

OBJECTIVE 3 . . . . B-26

A REVIEW OF THE FEDERAL CIVIL SERVICE AS AN INTERNAL LABOR MARKET . . . B-29

CONCLUSIONS B-31

APPENDIX I B-32

List of Tables

Page Number

Table 1: Regression Results Predicting Salary, 1977, from Education, Experience, Age, and Training for Blue-Collar Workers, Entry 1974, and On-Board 1974. . . . . B-9

Table 2: Regression Results Predicting Salary, 1977, from Education, Experience, Age, and Training for Blue-Collar Workers, by Minority/Sex Group. B-11

Table 3: Pay Structure of White-Collar Workers and Blue-Collar Workers, for 1977 Salary. B-13

Table 4: Private Returns (in Dollars) to Institutional Job Training for White-Collar Federal Civil Servants, 1974-1977, by Employee and Minority/Sex Group. B-16

Table 5: Returns to Cost and Hours of General and Specific Training, Net of Independent Effects, Entrants, 1974. . . . . B-19

Table 6: Total Cost of General and Specific Training, 1975-1976, by Employment Status, White-Collar Workers. B-21

Table 7: Net Economic Detriment by Minority/Sex Status, for Four Entry Cohorts, 1963-1977, Predicting Entry and Later Salaries. B-24

Table 8: Pay Structure of Minority/Sex Groups, for Four Cohorts, 1963-1977, Predicting Entry Salary. B-27

FINAL REPORT:

Baseline Research on the Operations of the Federal Government

Department of Labor Grant #A20-11-79-32,
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Introduction

In the 1960's and 1970's, we witnessed a growing concern with the tenets of neoclassical economics, especially as these basic assumptions referred to labor supply and demand (Becker, 1964; Thurow, 1969; Blau and Duncan, 1967). Human capital theory in economics and status attainment research in sociology both sought to identify those characteristics of individuals which ultimately lead to differentials in wage rates or the incomes of workers. Such characteristics include but are not limited to age, work experience, education, job training, vocational training, and race and sex, although these latter two characteristics are not necessarily related to skills and abilities. Although these traditions have provided basic information on worker traits and wages, there has been a noticeable lack of attention to irregularities in the labor market which would cause wage returns to vary, by labor market sector, by race, and by sex.

The research undertaken during this project has attempted to estimate the effects of certain labor supply characteristics within one labor market--the Federal civil service. By isolating workers within one labor market, we are able to separate to some extent the confounding influences of labor market segment, race, sex, and labor demand (hours worked, type of appointment, etc.). For example, the finding that women and minorities have lower returns to investments in human capital has been well-documented. However, we do not know whether differences in returns to education and other labor supply characteristics by race and sex are due to, for example: (1) location in a particularly well paying versus poorly paying labor market; (2) years of experience in that labor market; or (3) job training provided by an employer. These are only a few of the possible influences on income that are generally left unexamined in studies of the returns of investment in human capital, and yet such influences surely operate to elevate or depress wages. Our study of the Federal service should provide baseline information as to the possible extent of income inequality by race and sex net of labor market effects.

Organization of the Report

For clarity of presentation, this report is organized into five main sections. First, we will discuss the research design and data set used in our analyses. Throughout this section we will indicate the significance of certain labor market characteristics of the Federal government and those which are measured in our data set.

The next three sections deal with the specific hypotheses and objectives enumerated in our proposal to the Department of Labor. These hypotheses and objectives (listed in Appendix 1) fall into the areas of Blue-Collar Workers, Training, and Equal Employment Opportunity.

Finally, we end with a summary statement of our work for the Department of Labor, and the relationship of this work to that undertaken by two other teams of investigators researching the Federal labor market, Northwestern University (J.J. Couturier, principal investigator) and Operations Research Incorporated (J.J. O'Leary, principal investigator).

Research Design and Data Set

In 1962 the Federal government moved to computerize its payroll records, and began the Federal Personnel Statistics Program (FPSP), a longitudinal work-history file on a ten percent sample of Federal civilian employees. The aim was to provide a statistical basis for work force analyses which would contribute to rational personnal management. Over the years, changes in the automated data system have improved the accuracy of the records while increasing both the amount of information stored on each employee and the number of employees in the file. In 1972 FPSP was superseded by the Central Personnel Data File (CPDF). Like its predecessor, CPDF covers virtually the entire Executive Branch, except for White House staff, intelligence personnel, employees of the Tennessee Valley Authority, and politically appointed heads of agencies. Included also are the General Accounting Office, the Government Printing Office, the U.S. Tax Court, and the administrative offices of the Federal court system (see Schneider, 1974). Transaction histories are now maintained on 100 percent of these employees.

Monthly agency reports, submitted to the Office of Personnel Management by each Federal agency, have been merged with the CPDF to provide constant updating of personnel actions occuring throughout the Federal civil service. In the report that follows, we draw from that compilation of data. The bulk of the original data analysis in the chapters that follow is based on the official personnel records of a one percent sample of Federal employees, drawn primarily from FPSP and CPDF. Additional files, such as the Minority Group Designator File, the Retired Military File, and the Training File, were also tapped for information to build our longitudinal file, referred to here as the Federal Career File, or FCF. This composite data file on over 69,000 individuals employed by the Federal government for any length of time between January, 1963 and June, 1977 was made available for our use by the Office of Personnel Management.

The information included on FCF is of considerable variety. For example, on each Federal employee a status record as of June, 1977 (or as of their separation from Federal employment) includes information on birth date, education, agency, geographic location, sex, minority group status, pay group, salary, veteran's status, length of Federal experience, and so forth. The dynamic analysis in our study is possible from the information contained on transaction records for each employee. The number of personnel transaction records varies by employee, and in principle has no upper bound. The minimum is one, for those who had just entered Federal service in June of 1977 or shortly before, or whose first transaction in FPSP recorded their departure from the Federal service. The observed maximum in our sample is 64 for a long-term employee with, quite obviously, frequent transactions. The average is 8. Personnel actions recorded include, but are not limited to, grade increase, occupation change, merit pay increase, salary adjustment, demotion, geographic change, agency transfer, furlough, military leave, and separation, with codes available to distinguish the reasons for a transfer, separation, or furlough. Personnel actions can also include a change in status, such as from career-conditional appointment to career, or from excepted service to competitive. Many of these terms will be discussed in later sections. Readers who wish more detailed information should consult the Federal Personnel Manual, Processing Personnel Actions, and Personnel Data Standards, all published by the Office of Personnel Management (formerly the U.S. Civil Service Commission).

The final portion of FCF consists of information on job training by employee from 1974 through 1977, and includes cost and hours of training, purpose of training, type of training, and other related data. We are able, by the manner in which these various data elements were merged into FCF, to link demographic characteristics of an individual with a history of personnel transactions and training instances.

For our research under this grant, we used the data from the FCF to assess the effect of various individual worker characteristics (such as education, years of experience, etc.) on salary using least squares regression analysis. Specific characteristics, or variables, of interest were operationalized and their effects on salary or training were assessed net of the effects of other confounding characteristics such as age, sex, and race. While there are certain limitations in this method of analysis (the specifics of which are discussed later), this method of analysis follows in the tradition of human capital and status attainment research, as well as being a suitable method to maximize the detailed information in our data set.

I. Blue-Collar Workers

Many studies of returns to on-the-job training and education were fashioned around the experience of blue-collar workers, where increments to time on-the-job and skill level were readily transformed in hourly wages. It is therefore fitting that we begin our discussion of the Federal labor market with the analysis of blue-collar workers.

In the Federal civil service, blue-collar workers comprise about 30 percent of all employees and are distributed across the same geographic areas as white-collar workers. While many of the blue-collar workers are associated with the operations of the military and are found in such occupations as aircraft maintenance, aircraft supply, etc., the Federal government also has many positions filled in occupations such as supply clerk, dispatcher, and food service. In fact, there are more blue-collar job titles than there are white-collar titles in the civil service.

Similar to the agency and geographic dispersion of white-collar workers, blue-collar workers are governed by many of the same personnel regulations that govern white-collar workers. Although the pay systems of blue-collar workers are more varied than those of their white-collar counterparts, they are nonetheless subject to similar requirements regarding suitability for employment, requisite levels of education and experience for the job being filled, rates of advancement, and so forth. Therefore, status attainment and human capital models developed to fit the white-collar employees might likewise be representative of the earnings function of blue-collar workers.

As an amendment to our study under the National Institute of Education we developed three hypotheses and one objective (question) regarding blue-collar workers. First, we wished to establish that similarity between the Federal government labor market and the private sector with regard to returns to schooling and experience among the blue-collar work force. We therefore posited the hypothesis that:

> H(1) Years of schooling and amount of on-the-job training will be positively associated with salary among blue-collar workers.

Using regression least squares procedures, we regressed salary in 1977 onto twelve independent variables for a cross section of the blue-collar Federal work force. The results from this analysis are presented in Table 1.

Presented in Table 1 are the regression coefficients for each of the independent variables predicting 1977 salary for two groups of blue-collar workers. We examined both employees who entered in 1974 and were still on-board in 1977, and those employees who were on-board in 1974 and still employed in the Federal government in 1977, regardless of when they entered. The regression equations predicting 1977 salary use the same variables for both employee groups with the exception of years of Federal service. In the 1974 Entry cohort, years of experience was not varied since these employees all entered at approximately the same time. Therefore, YEARS and YEARS Sq. were not entered into the analysis for the Entry group.

As to be expected, education has a positive effect on salary, net of the skill categories, age, and minority/sex group. For each year of schooling, blue-collar workers who entered in 1974 received $216 on the average. Curiously, however, hours of classroom-style job training which they received (TRAINING) is not positively associated with salary. For every hour of job training received, the entry blue-collar worker received no noticeable increment to their salary.

When the results of the on-board group are studied, we note that all types of skill-producing characteristics are positively related to salary. For each year of education an employee has, there was a return of $315 in salary. Similarly, years of Federal employment experience was positively related to 1977 salary (b = $189) as was age of the employee (b = $211). Significantly different from the entry cohort, however, is the fact that on the average, the on-board employees received $2.33 for each hour of classroom style training which they received. This finding suggests that the training received by blue-collar workers early in their tenure with the Federal government is not training which can advance their careers, but rather is training necessary for them to work at some minimal level in their job. For more senior workers, however, such training can be used to augment their earning capability, by allowing them to move ahead in their job, to move into supervisor positions, or to make occupation or agency shifts.

Consistent with findings on white-collar workers, minorities and women earn considerably less than white males for both the entry group and the on-board group (see Taylor, 1979; and Taylor and Grandjean, 1979).

Table 1: Regression Results Predicting Salary, 1977, from Education, Experience, Age, and Training for Blue-Collar Workers, Entry 1974, and On-Board, 1974.[1]

Independent Variables[2]	Unstandardized Regression Coefficients	
	Entry, 1974	On-Board, 1974
Education	216*	315***
Years	-	189***
Years Sq.	-	-2.39***
Age	144	211***
Age Sq.	-1.79	-3.25***
Training	-.03	2.33***
Minority Male	-425	-952***
Non-Minority Female	-1595*	-1898***
Minority Female	-1733**	-1440***
R^2 (adjusted)	.338	.341
N	153	2824

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[1] For those still on-board as of June, 1977.

[2] Net of dummy variables for premium skilled, skilled, semi-skilled, and unskilled. Throughout this table and the remaining text, minority employee refers to those employees who were designated as Negro/black, Hispanic, American Indian, or Asian/Oriental.

In sum, these results suggest that blue-collar workers in the Federal government show earnings functions similar to blue-collar workers in the private sector, at least in broad outlines.

Given the significant pay differences between the minority/sex groups as illustrated in Table 1, a logical question which flows from that finding is, are there differences in the pay structure for the minority/sex groups which account for differences in salary levels? This brings us to Hypothesis (2), that,

> H(2) The association in H(1) will be stronger for non-minority males than for any other minority/sex group.

We reasoned that salary differences among groups of workers are due to the perceived quality of schooling, experience, etc., and that such quality was perceived to vary by minority/sex group. Therefore, even if minority males, for example, had as high a mean education level as white males, minorities would not reveive as much in total salary based on their education as white males.

In Table 2, we present the results of regression analyses. In this table, an income determination function was fitted to each minority/sex group separately. Therefore, we allow for the interactive effects of race, sex, and employment characteristics.

The results show greater similarity for the two groups of males than we had initially expected to find. For example, training is significantly related to salary for non-minority and minority males only. Similarly, education is significantly related to salary for both groups of males rather than for either group of females. And although years of Federal work experience is positively related to salary across all four groups, the returns to experience are more similar for non-minority and minority males as compared to any other two groups of employees.

The coefficients for the two groups of females while not significantly different from zero, are generally in the same direction as that of males. This is not true, however, for age for non-minority females and training for minority females, coefficients which do not attain statistical significance.

We should note, however, that these tentative conclusions on the pay structure of employees in the Federal blue-collar sector are based on relatively small sample sizes for both groups of women. Significance levels may be more difficult to sustain with the small numbers of females. At any rate, the initial hypothesis which we put forward does not appear to be substantiated by these findings.

On the other hand, it could be argued that the skill group control may have depressed the returns to human capital investments. That is, white males receive greater returns to education, etc., because they are able to place themselves into higher paying skill categories. In lower-skilled work categories, the pay structure might not be flexible enough to allow for variability in educational attainment. Hence, the returns to education would be depressed, whereas seniority, for example, might have a greater impact on salary. We performed such an analysis (not presented here) and concluded

Table 2: Regression Results Predicting Salary, 1977, from Education, Experience, Age, and Training, for Blue-Collar Workers, by Minority/Sex Group.[1]

	Unstandardized Regression Coefficients			
Independent Variables[2]	Non-Minority Males	Minority Males	Non-Minority Females	Minority Females
Education	341***	273***	351	115
Years	218***	136**	285*	481***
Years Sq.	-3.12***	-1.80	-6.51	-12.71***
Age	253***	108	-67	17
Age Sq.	-3.14***	-1.47	1	-.72
Training	2.32**	3.39*	19.35	-1.97
(constant)	3450***	6205***	6728	8538**
R^2 (adjusted)	.271	.266	.233	.289
N	1826	778	85	135

[1] For the on-board sample as of June, 1977.

[2] Net of dummy variables for premium skilled, skilled, semi-skilled, and unskilled workers.

again, that non-minority and minority males are still more similar to each other than to any other group of employees. However, the returns to the human capital variables of education and experience did attain statistical significance for all four groups, suggesting that skill level placement markedly affects increments to salary which would be generated by education and experience, especially for women.

Interest in pay structures has in part been generated by the continuing differences in salary between race and sex groups. Part of our interest in the analysis of the Federal government is the comparison of blue-collar and white-collar workers. Given some similarity in the types of regulations which affect all Federal workers, as well as similarities in the manner in which the regulations are applied, we would expect that there would be similarities in the pay structures of blue-collar and white-collar workers. As one of our objectives in this research, we posed the question:

> O(1) Does the pay structure (i.e., the determinants of earnings) of blue-collar workers differ from that of white-collar workers?

We performed separate regression analyses on a sample each of blue-collar and white-collar workers, using the variables outlined earlier. We also entered dummy variables for the minority/sex groups, as well as dummy variable controls for the occupational and skill groups (see footnote 2, Table 3). For each sample, we are comparing full-time employees who were on-board in 1974 and remained on-board until June, 1977. Salary in 1977 is the dependent variable.

There are five results from the regression analysis which appear especially noteworthy. First, the variables used to predict salary explain more of the variance for white-collar workers than for blue-collar workers. This is in part due to the explanatory power of the occupational group categories used as control variables for white-collar workers, as compared to the skill categories used in the blue-collar regression.

Secondly, the returns to most human capital variables are larger for white-collar workers than for blue-collar workers. For example, each year of schooling receives on the average $565 in salary increment among white-collar workers, but only $315 for blue-collar workers. These differences, however, are in part due to differences in the salary ranges for each group of workers. When the elasticities were examined, we found that the average percent returns are much more similar between the two groups of employees (data not presented here).

A third result of note, and one perhaps most critical to assessing the degree of similarity between the pay structures of the two groups, is that the ordering by size of the human capital coefficients is identical between the two groups. Education appears to have the greatest salary returns, while classroom style training has the least. This finding suggests that the pay structures of blue-collar and white-collar workers are generally similar, at least according to the variables measured here.

Of note also is that classroom style training does not appear to have a significant impact on salary for white-collars once occupational group is controlled. That is, occupational group, net of education and race/sex group

Table 3. Pay Structure of White-Collar Workers and Blue-Collar Workers, for 1977 Salary.[1]

	Worker Group	
Independent Variables[2]	White-Collar Workers	Blue-Collar Workers
Education	565***	315***
Age	225***	189***
Age Sq.	-2.56***	-2.39***
Years	281***	211***
Years Sq.	-3.41***	-3.25***
Training	.04	2.33***
Minority Male	-999***	-952***
Non-Minority Female	-2938***	-1898***
Minority Female	-2656***	-1440***
R^2 (adjusted)	.633	.341
N	10,360	2,824

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[1] For all workers who were on-board in 1974 and remained to 1977.

[2] Net of occupational group. For white-collar workers, these groups are professional, administrative, technical, clerical, and other. For blue-collar workers, these groups are premium skilled, skilled, semi-skilled, and unskilled.

for example, determines both the amount of training one receives as well as determining salary for white-collar workers. For blue-collar workers, however, training has a substantial impact on 1977 salary.

Finally, salary inequality by race and sex is apparent for both groups of employees. While minority males earn significantly less than non-minority males, both groups of female employees earn significantly less than do minority males. And, in fact, the minority/sex groups fall in the same order of salary inequality vis-a-vis non-minority males for both white-collar and blue-collar employees.

Given that the employment experience is different for blue-collar and white-collar workers, it would be difficult to assess all employment characteristics affecting salary. The results here suggest, however, that the pay structures are similar in kind, if not in degree of returns for both groups of workers.

The difference between the two groups of employees in the effects of classroom style training is curious given that there is considerably more money and time spent on training among the white-collar work force than among the blue-collar group.

We now turn to an examination of the returns to classroom style training in the Federal government.

II. Training

Classroom style training differs in a number of respects from on-the-job training, or OJT (see Taylor, 1980). Job training which has been institutionalized into a classroom setting, away from the work site, we refer to here as Institutionalized Job Training, or IJT.

A major concern in this research is the relationship of returns to training by minority/sex group. As we saw above, for a cross-section of white-collar employees there is no significant salary return to training. In part, that finding could be confounded by: (1) the use of hours of training rather than cost of training; (2) differences in returns to training across employee cohorts with younger employees experiencing greater returns to training but old employees receiving little benefit; and (3) a different relationship of training to career advancement for each minority/sex group.

These concerns led us to an analysis of returns to training by minority/sex group, and we hypothesized that:

> H(3) Returns to training will be greater for non-minority males than for any other minority/sex group.

To estimate whether there are, in fact, different monetary returns to IJT, an earnings function for each minority/sex group was estimated using 1977 salary as the dependent variable. Cost of IJT was entered as a predictor variable in regression equations along with additional control variables specified in Model 1 (education, age, square of age, and for the on-board population, seniority and square of seniority). Model 2 for each minority/sex group introduces the control for occupational stream, while Model 3 adds pre-training salary. The results from these analyses are presented in Table 4.

Among the 1974 entrants to Federal employment, IJT provided the greatest returns to non-minority males under Model 1. However, with additional controls for PATCO and pre-training salary, the returns to the dollar investment in IJT drop dramatically for non-minority males, but the controls for PATCO and pre-training salary actually increase the returns for the other three minority/sex groups. According to the results from Model 3, the 1977 salary of non-minority males was increased an average of 48 cents for each dollar the Federal government invested in their IJT. However, minority males received a private return of $1.01 on each dollar invested in their IJT; non-minority females received a return of $.98 on the average for each dollar invested in their IJT, and minority females received a return of $.90 (although statistically non-significant). The higher rates of return to IJT for minorities and women among the Entrants suggest that their salary levels could be improved vis-a-vis non-minority males if they were given equal access to IJT. For example, white females had a rate of return on IJT of $1.00 net of occupational stream, pre-training salary, etc. If they had been given as much training as non-minority males ($269) rather than their own $90 worth of training, their average salary would have risen by $179 more than it did. Since non-minority females' salary increased by $1,607 during the period covered here, the $179 in additional salary generated by increased access to training would constitute an additional 11.1% increase in salary.

These findings are somewhat surprising given the data presented by Mincer (1962) and others where the estimated returns to OJT were greater for white males than for other minority/sex groups. However, introduced in this analysis is a control for occupational placement and employer, as well as a more precisely defined cohort of employees who entered employment over a one-year period. We should add that this same pattern of results is obtained when number of hours of training is used instead of cost of training. These qualifications necessarily make these analyses different from earlier estimates of the effect of training, along with the different type of training being considered here (although Rosenfeld, 1980, obtains similar results). Moreover, these analyses should not be taken as definitive for employees of other labor markets, where rules governing competition, promotion, etc., may be very different. As a "structured labor market" (Phelps, 1955), the response of the civil service to the supply of workers may be different from more open and unprotected markets. However, this should affect only the magnitude of the returns to training rather than the pattern of the relationships between minority/sex groups.

When the on-board population of Federal employees is analyzed, we find a drop in the returns to IJT for all minority/sex groups of employees. In fact, in Model 3, three of the four coefficients are negative and the fourth (minority males) is non-significant. In part, these findings can be explained by three factors. First, these employees have been in the Federal service for an average of 11.5 years and have therefore been moving along their career paths for a considerable time. This would mean that there may be a limit to future job moves since they have already closed some career options. That is, there is less of a chance for a return to training simply because there are fewer job slots for the trainees to move upward and into. This is consistent with studies of OJT that report a declining rate of return as the employee

Table 4: Private Returns (in Dollars) to Institutional Job Training for White-Collar Federal Civil Servants, 1974-1977, by Employee and Minority/Sex Group.

	Employee Group	
Minority/Sex Group	Entrants, 1974[d]	On-Board, 1974[d]
Model 1[a]		
Non-Minority Males	1.77***	.65***
Minority Males	.20	.90***
Non-Minority Females	.98*	.94***
Minority Females	.04	.48#
Model 2[b]		
Non-Minority Males	.75*	.24***
Minority Males	.16	.41**
Non-Minority Females	.72*	.21
Minority Females	1.23	.04
Model 3[c]		
Non-Minority Males	.48*	-.12***
Minority Males	1.01#	.07
Non-Minority Females	.98***	-.50***
Minority Females	.90	-.50***

a: Variables entered into the model are education, age, square of age, length of Federal service, and square of length of service.

b: Variables entered in the model are education, age, square of age, PATCO, the minority/sex variables, length of Federal service, and square of length of service.

c: Variables entered in the model are education, age, square of age, PATCO, pre-training salary, the minority/sex variables, length of Federal service and square of length of service.

d: Levels of statistical significance are: #, $p \leq .1$; *, $p \leq .05$; **, $p \leq .01$; and ***, $p \leq .001$.

ages. Second, however, is the fact that some training in the Federal service is given only after an employee has advanced to a certain level, and the higher the level, the more likely this is the case. For example, the three training centers for middle level managers and staff personnel are open only to those persons who are in General Schedule grades 13-15. The Federal Executive Institute is open only to GS 16-18's (and a few selected GS-15's). Moreover, all GS 16's must attend the FEI within one year of their promotion into the supergrades. Therefore, some of the most expensive and extensive IJT comes after a promotion for the longer-term employees. It might be argued that IJT for these employees results only in enterprise returns rather than individual returns. That is, the increased productivity of an employee brought about by improved skills from IJT are "captured" by the employer, rather than returned to the employee. Finally, it could be that formal job training mid-way through a Federal career may be given disproportionately as remedial OJT; that is, IJT is given to older employees who have somehow missed the lessons from experience on-the-job.

While job training is certainly distinct from education, and IJT as we have shown here is distinct from OJT, at least two types of job training have been distinguished by Becker (1964) and others in their analyses of labor market experience. General job training is regarded as skills development which is transferable from one employer to another. Courses or instruction in reading skills, general factory procedures, or equipment maintenance would be examples of general training. According to the human capital model, employers would be reluctant to invest in general training for their employees since such skills are employable elsewhere. Should an employee be trained in skills which are transferable, then the employers might easily lose their investment in the employee from attrition, or be forced to pay more in wages to keep generally trained employees from leaving. On the other hand, specific training for employees should be preferred by employers since specific training, by definition, is not transferable from one employer to another. That is, training in a computer system operated by only one company, or training in an occupation which is specific to one employer, or training in a manufacturing process used by only one firm, is said to be specific in nature. Since the employee is unlikely to be able to use such skills in any other employment context, the employer need not increase wages based only on training.

This, of course, is a rather abbreviated treatment of Becker's work on general vs. specific training, and he himself acknowledges that the distinction between general and specific training is that of opposing ideal types (see also Lloyd and Neimi, 1979:123). Nonetheless, such a theoretically appealing division of job training suggests much about the response of employers and employees to training, and makes assumptions about the relative worth of trained versus untrained employees. Therefore, we hypothesized that:

> H(4) Individual salary returns to general training will exceed those to specific training.

Heretofore, the distinction between general and specific training has been based largely on theoretical, mathematical models, since there has been relatively little investigation of the effects of various training programs by type of training (i.e., general or specific). But, there are some substantive reasons to suspect that a distinction between general and specific training might not have economic validity for all labor markets. First, employers not only invest cost of training in their employees, but they invest time as well--time separate from that which is related to the cost of training. That is, employers must manage their labor pools to keep suitable, qualified employees in line for openings which occur in their firm or agency.

Since recruitment from outside the firm is likely to be costly and time-consuming, employers have an incentive to increase the wages of trained employees to keep them with the firm, especially if the training is specific in nature. That is, direct training costs are only a part of the total training cost. Secondly, and as Becker notes, some "specific" training includes a general component, so that skills learned in, and for, one setting can be elaborated on or refined to fit another employer. Training may be more specific than general, and vice versa, but it would be difficult to separate them completely. Thus, any on-the-job training should be useful in increasing productivity and in increasing wages. Thirdly, the human capital model seems to ignore a credential effect which could be generated by training courses, whether they be specific or general. The persons who receive training are not only assumed to have more skills after training but may also receive some increment to salary simply because they were deemed deserving of training expenditure. Also, most persons have an expectation that training increases their worth to an employer, regardless of whether the training is specific or general. Given an expectation that their wages should increase with training, there will be pressure to increase wages after an employee has received any training.

By its method of record keeping, the Federal government makes possible a distinction between general and specific job training. Using the same training file as described earlier, information on purpose of training is kept for each instance of training. General job training, that is training not specific to the Federal government, included the following: training courses for new technology, to improve present performance, to meet future staffing needs, as trade or craft apprenticeship, and for adult basic education. Specific training includes: training for a new work assignment, for a program change, to develop unavailable skills, and for orientation to the Federal government. These two types of training are operationalized as training which is either specific to the Federal government or not, rather than as training specific to an occupation. The definition for these types of training are derived from Becker (1964). The particular ones used by the Federal government are reported in the notes to Table 5.

For both specific and general training, regression analyses were undertaken where 1977 salary was regressed separately onto cost of either specific or general training received during 1975 and 1976, and hours of either specific or general training. The results from these four regression equations for the 1974 Entrants are reported in Table 5. The effects of training on salary are net of pre-training salary, and eight additional independent variables. The findings are somewhat surprising. While human capital theory predicted that returns to general training would be greater than returns to specific training, the analyses here present mixed results. Cost of specific training has a greater individual return than does cost of general training, although the difference between the two estimates is statistically nonsignificant. The reverse pattern is found for hours of general and hours of specific training, and similarly the difference of the two coefficients is statistically nonsignificant. In all cases, however training is measured, it is positively related to salary, although the level of significance is only $p \leq .10$ for hours of specific training.

Table 5: Returns to Cost and Hours of General and Specific Training, Net of Independent Effects, Entrants, 1974[a]

	Type of Training	
Measure of Training	General[b]	Specific[c]
Cost	.66***	.80*
Hours	4.47***	2.22#

[a] Net of education, age, age squared, Federal service, Federal service squared, PATCO, minority/sex group, agency, and pre-training salary. Levels of significance of the coefficients are: *** = p<.001; * = p<.05; # = p<.10.

[b] General training is defined by the following purposes of training:

new technology--to provide the knowledges or skills required to keep abreast of developments in the employee's occupational field, or in a related field. (State-of-the-Art)

improve present performance--to provide the knowledges or skills needed to improve or maintain proficiency in present job.

future staffing needs--to provide the knowledges and skills needed to meet future staffing needs through a planned career development program in an occupation specialty.

trade or craft apprenticeship--to provide the classroom or group portion of the formal training that , together with guided work experience, permit the employee to acquire the knowledges and skills needed to meet the full requirements for journeyman status in an apprenticeship program.

adult basic education--to provide the basic knowledges and skills needed to permit the employee to function in the world of work.

[c] Specific training is defined by the following purposes of training:

new work assignment--to provide the knowledges and skills needed as a result of assignment to new duties and responsibilities, when such training is not a part of a planned career development program.

program change--to provide the knowledges or skills needed as a result of change in agency mission, policies, programs, or procedures.

develop unavailable skills--to provide the knowledges or skills needed for fields of work that are unique to the Federal Government, or to meet Government staffing needs in occupations for which the labor market cannot produce a sufficient number of trained candidates.

orientation--to provide orientation to the policies, purposes, mission and functions of the employing agency or the Federal Government for new employees.

These findings suggest two important conclusions. First, specific and general training are important for new entrants as we saw earlier. But second, specific training obtains monetary returns at least equal to general training. Thus, somewhat contrary to the conclusion drawn by Becker and others, an employer (i.e., the Federal government) does remunerate employees for specific training even though such training might not be used by another employer. Concerns with this part of human capital theory were expressed earlier and need not be repeated.

However, a question naturally arises as to why the Federal government might vary from the expected pattern of returns to specific and general training. First, it should be noted that the Federal government is a very large employer. An employee could move from one agency to another after receiving training. Hence, an employee could obtain significant returns to specific training by changing agencies for a promotion after receiving specific training in the first agency. To the extent that this argument is valid, the Federal government faces the dilemma of a bureau or division paying for employee training only to have the employee hired away by another bureau or agency. There are some provisions against such moves in training agreements, however. Usually an employee who receives IJT signs a statement that he or she will not leave the first agency for a specified period of time, usually three to six months. This policy suggests an attempt to inhibit agency shifts by recent trainees. However, this limitation would probably not be very effective in limiting job changes across agency lines for a very good reason. Procedures for job changes which occur across agencies are likely to be initiated only after a trainee has made contacts during a training session. Given the length of time required for job vacancy announcements, panel review of applications, interviews, etc., the trainee has more than likely repaid any time owed to the first agency.

All in all, the findings presented here necessitate a revision of the relative returns to specific versus general training by the size and organization of an employer. That is, large firms may show significant returns to specific training whereas small firms do not since employees can move among major firm subdivisions.

Another related issue in the study of job training is the notion that since general training can be used by many firms, those persons who receive general training may be more likely to leave a firm than those who receive specific training. Given the concern for fiscal responsibility and cost accounting in the Federal bureaucracy, there is a more generalized concern that persons who are likely to terminate their employment do not receive considerable amounts of training funds which would then be lost to the government as an employer. Concern with such issues brings us to Objective 2:

> O(2) What is the annual cost of general and specific training in dollar outlay for employees who remain in the Federal service and for those who leave?

Using the FCF, we estimated the cost of training by type of training for two groups of employees: those employees who entered Federal service in 1974 and left by 1977, and those employees who entered in 1974 but were still on-board in 1977. Presented in Table 6 are the sample estimates for cost of classroom style training 1975-1976.

Table 6: Total Cost of General and Specific Training, 1975-1976, by Employment Status, White-Collar Workers.[1]

	Cost of Training by Employment Status	
Type of Training[2]	Entered, 1974, and Terminated by 1977 (N = 937)	Entered, 1974, and Remained to 1977 (N = 691)
General	$2,801	$97,217
Specific	$ 577	$18,746

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[1] The termination group consists of all persons regardless of hours worked, career status, or service. Those who remained with the Federal government are full-time employees.

[2] See footnotes b and c to Table 5 for explanation of types of training.

These figures are only rough estimates as to the cost of training since intra-agency training is not included, nor is employees' salaries figured into the cost. However, from the data in Table 6, it appears that Terminators are far less likely to receive Federal funds for IJT. Per person terminators received less money than the on-board employees, as well as receiving fewer total funds as a group. And, in keeping with the tenets of human capital theory, terminators received fewer funds for specific training than for general training. However, the same can be said of the on-board sample, where we might have expected more funds spent on specific training than on general training.

Clearly, more investigation should be done in this area. Our particular sample is not as well suited to answer Objective 2 as is desired. Questions need to be answered regarding the types of employees who receive training and leave. Why did they leave Federal employment? Are the terminators obtaining jobs in the private sector? If so, what is their salary? The records the Office of Personnel Management is collecting cannot answer these and other important questions regarding resource utilization and employment status. The answers to such questions may better aid managers in the allocation of training funds for more effective personnel planning.

III. Equal Employment Opportunity

Our third area of investigation under this grant was the assessment of income inequality over time by race and sex group in the Federal government. Earlier research by Taylor (1979) pointed to large income gaps between minority/sex groups even when differences in employment profiles such as education, age, and experience were statistically controlled. However, given the efforts expended on affirmative action programs, the negative connotation associated with employment discrimination, and a generalized belief that women and minorities have been discriminated in the past, we should find a decrease in earnings gaps between the minority/sex groups. We therefore hypothesized that:

> H(5) Among white-collar workers, salary discrimination by race and sex has declined from 1967 to 1977.

Using the one percent sample of Federal civilian employees divided into four entry cohorts, we performed regression analyses using salary at three separate times as the dependent variables. These three dependent variables, salary at entry (time point 1), salary approximately three years later (time point 2), and salary in 1977 (time point 3), were regressed onto the following independent variables: education, handicapped veterans, other veterans, age, square of age, months of experience, and square of months of experience. The last two controls were of course not included in the regression of entry salary.

To assess the effect of minority/sex group status on salary, we entered three dummy variables for minority/sex group (minority males, minority females, and non-minority females). As the deleted category is non-minority males, the unstandardized coefficient for each minority/sex group should reflect the salary difference between that group and non-minority males, net of the other independent variables. This type of analysis represents the best joint fitting (or additive) model of income differences. While an analysis of income differences based on each minority/sex group's statistical earnings structure would permit an examination of interactions (Taylor, 1979), such an analysis would be rather suspect here, given the small numbers of minority males and females in the entry cohorts.

For each cohort the three salary variables yield three different regression analyses. In the first of these, entry salary is the dependent variable, and the independent variables include the three minority/sex dummy variables and the background variables listed above. In a separate step, we enter four dummy variables of occupational group (Professional, Administrative, Technical, Clerical, and Other--PATCO) to control for the possible effects of job stream (see Spilerman, 1977).

For the second multiple regression for each cohort, the dependent variable is salary approximately three years after a cohort entered Federal service, a salient point in the competitive civil service since employees obtain "career status" and associated tenure rights after three years of substantially continuous service. In a second step, we add another control variable--entry salary. In the Federal service, entry salary may be taken as a proxy for GS grade, and since rate of promotion from one grade to the next is regulated by law, it is necessary to control statistically for entry salary to examine salary disparities due to internal personnel actions rather than to initial grade level of placement. The PATCO variables are entered in a third step of the regression, again to control for job stream as of that time.

Finally, the third regression for each of the four cohorts uses 1977 salary as the dependent variable with the independent variables entered as described above for the second set of regression estimates. Since statutory upper limits on Federal salaries greatly reduce the skewness of salary as compared with individual income, the usual logarithmic transformation of the dependent variable in such analyses is not used here. All salary figures are expressed in 1977 dollars.

The estimates of salary disparity between non-minority males and the other three minority/sex groups are presented in Table 7. Two time points in the analysis are especially instructive for our purposes.

First, the disparity in entry salary for minority males relative to non-minority males has decreased over time, as has the salary disparity for non-minority females. However, the earnings gap at entry has increased for minority females, from -$1,876 for the 1963-65 cohort to -$2,721 for the 1972-73 cohort. Although a control for occupational stream at entry (PATCO) reduces somewhat the net earnings gap between non-minority males and others, the gap at entry remains substantial for both groups of women.

Second, for each cohort the salary gap three years after entry reveals a similar trend in deficits accruing to female status. For both groups of women, the salary deficit at this second time point is greater in the most recent cohort than in the earliest cohort reported. In fact, for minority females the pattern is a neat, linear one in which the salary disparity increases from -$2,548 for the earliest cohort to -$3,471 for the 1972-73 cohort. For minority males, however, the salary disparity, while always negative at the second time point, establishes no clear time trend but changes from -$803 for the earliest cohort to -$259 for the latest.

Table 7. Net Economic Detriment to Minority/Sex Status, for Four Entry Cohorts, 1963-1977, Predicting Entry and Later Salaries.

Cohort Entrants	Time Points	Dependent Variable[a]	Minority/Sex Group		
			White Females	Minority Males	Minority Females
1963-65 (N=831)	(1)	Entry Salary	-2,141***	-1,054*	-1,876***
		Net of PATCO	-1,750***	- 581	-1,306***
	(2)	1967 Salary	-2,178***	- 803	-2,548***
		Net of Entry	- 159	183	- 782***
		Net of PATCO	18	359	- 390#
	(3)	1977 Salary	-4,189***	-1,478*	-4,485***
		Net of Entry	-2,441***	- 671	-2,971***
		Net of PATCO	-2,168***	- 629	-2,705***
1966-68 (N=1082)	(1)	Entry Salary	-2,096***	- 534	-1,896***
		Net of PATCO	-1,459***	- 165	-1,246***
	(2)	1970 Salary	-2,633***	-1,071*	-2,649***
		Net of Entry	- 457*	- 459#	- 711*
		Net of PATCO	161	- 73	- 5
	(3)	1977 Salary	-4,138***	-1,319**	-4,390***
		Net of Entry	-2,220***	- 813*	-2,700***
		Net of PATCO	-1,623***	- 221	-1,791***
1969-71 (N=679)	(1)	Entry Salary	-1,652***	- 792	-2,113***
		Net of PATCO	-1,269***	- 499	-1,456***
	(2)	1973 Salary	-2,650***	-1,162*	-3,022***
		Net of Entry	-1,096***	- 505#	-1,083***
		Net of PATCO	- 692***	- 262	- 587
	(3)	1977 Salary	-3,647***	- 765	-4,138***
		Net of Entry	-2,218***	- 9	-2,336***
		Net of PATCO	-1,454***	298	-1,574***
1972-73 (N=744)	(1)	Entry Salary	-1,775***	374	-2,721***
		Net of PATCO	-1,620***	464	-2,463***
	(2)	1977 Salary	-2,500***	- 259	-3,471***
		Net of Entry	- 938***	- 586*	-1,140***
		Net of PATCO	- 711***	- 309	- 668*

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a: The dependent variables are standardized to 1977 dollars. The first step of each regression includes education, D.C., handicapped veterans, other veterans, age, square of age, and the three minority/sex variables. PATCO and entry salary are entered on subsequent steps where appropriate. Months of experience and square of months of experience are entered only in regressions (2) and (3) for all cohorts. Significance levels are reported as follows: #, $p \leq .1$; *, $p \leq .05$; **, $p \leq .01$; and ***, $p \leq .001$.

For all three minority/sex groups, the salary deficit at the second time point is generally greater than the salary deficit at entry, suggesting that inequality is cumulative during the three years from entry to career status. The sole exception to this pattern is minority males in the 1963-65 cohort.

When controls for entry salary and PATCO are introduced in the regression predicting salary three years after entry, the general effect is to reduce the salary disparity by $500 to $2300. An exception is minority males in the 1972-73 cohort. Even with these controls, however, the salary disparities at the second time point show the same pattern of intercohort increase as was observed without the controls. For example, minority males who entered in 1963-65 actually experienced a somewhat higher salary than non-minority males by 1967 once entry salary and PATCO are controlled, though the differences are not statistically significant.

This would suggest that minority males who might have been discriminated against at entry, were able to hold onto their initial placement as of four years later. Similarly, non-minority females evidence a similar pattern for the 1963-65 cohort. This same pattern emerges somewhat for the 1966-68 cohort, and for females in the 1969-71 cohort. By 1977, however, salaries for the three disadvantaged minority/sex groups in all cohorts showed an increasing distance in salary from non-minority males, even with the initial disadvantage at entry statistically controlled.

A rather ominous pattern in these data is that absolute dollar disparities seem to be increasing at the three year point from the earliest cohort to the latest. This suggests that income inequality in the Federal service may be getting worse rather than better, net of occupational placement, for the older cohorts. For example, in the 1966-68 cohort, the 1970 salaries of minority and non-minority males were essentially equal, net of entry salary and PATCO. The 1969-71 cohort of minority males was, by 1973, $505 behind non-minority males net of the initial salary difference. For the most recent cohort of minority males, the salary disparity after three years was -$586 controlling for entry salary. For non-minority females, the salary disparity increase was from a low of -$159 in the 1963-65 cohort at the three year point to -$938 for the 1972-73 cohort. Similarly, for minority females the increase was from -$782 to -$1,140. Moreover, this pattern may indicate that in the case of minority males, especially, salary discrimination has moved from entry placement to later in the career cycle.

Finally, a comparison of the 1977 net salary differences of the minority/sex groups with non-minority males re-affirms the conclusion that income inequality is cumulative over the career. For all minority/sex groups, the longer one has been in the Federal service as of 1977, the greater the 1977 salary detriment. For example, non-minority women in the 1963-65 cohort experienced a salary disparity of -$4,189 with non-minority males by 1977. With PATCO and entry salary controlled, this disparity decreased to -$2,168. However, non-minority females who entered Federal service in 1972-73 and had therefore been in Federal employment only four years instead of 13 years experienced only a -$2,500 difference. Controlling for entry salary and PATCO, this disparity dropped to -$711.

In summary, there are four patterns which seem to emerge from these data. First, income inequality at entry seems to be declining in the Federal civil service for non-minority women and minority men. However, minority women appear to be worse off in 1973 at entry than in 1963 vis-a-vis non-minority males. Second, income inequality seems to have increased by the three year point in these cohorts, rather than remaining static. That is, even when differences in entry salary are controlled, the income gap between non-minority males and others increased after three years of employment. Third, from the three year point in each cohort to 1977, income inequality increased across all three minority/sex groups. Finally, the income inequality of both minority and non-minority females vis-a-vis non-minority males is approximately three times as great as that experienced by minority males.

These total differences in salary over time substantiate the continuing challenge to eliminate pay discrimination. However, it is instructive to estimate how salary inequality is generated, and one such method is to compare the pay structures themselves over time. This brings us to Objective 3:

> O(3) What changes have occurred in the pay structures of the minority/sex groups over time?

To examine the pay structure of each minority/sex group the entry salary for employees in each minority/sex group was regressed onto education, entry age, entry age squared, D.C. or field status, disabled veteran, and other veterans' preference for four cohorts (see also Malkiel and Malkiel, 1973; Kluegel, 1978; and Taylor, 1979, for an explanation of this method). These variables most clearly capture the "human capital" of employees at time of entry into the Federal civil service, but do not include the effects of occupation, competitive status, or supervisory position since these latter employment characteristics are to a large extent controlled by the Federal agencies themselves in the employment process.

The results from these analyses are presented in Table 8. The first finding of interest is that the mean entry salary of employees (in 1977 dollars) has decreased over time from the 1963-65 cohort to the 1972-73 cohort. The only exception is non-minority females whose mean salary increased from $8,047 to $8,118 over the ten year time span. These data alone suggest that the external labor market effects are mediated by the regulations of the internal labor market, although the external market has effects where the internal market intersects with it. That is, during the expansionary period of the 1966-68 cohort, entry salaries increased slightly reflecting a greater demand over supply of employees. By the 1972-73 cohort, the demand for workers had fallen beneath supply and entry incomes fell. However, the 1972-73 entry salary of minority males and both groups of females as a percent of their 1963-65 entry salaries was higher than that of white males. These data have not been adjusted for changing occupational distributions or changing job qualifications such as education. But they do suggest that the Federal government may have been able to move in the area of affirmative action even while the external labor market was getting tighter.

Looking at the coefficients for education, we can note a decline in the return to one year of schooling at the mean for both groups of males, but in general, an increase for females. The return to schooling for white males fell from $758 in the 1963-65 cohort to $550 in the 1972-73, although this decline was not steady. A similar decline is also found for minority males, from $814 to $566. That both groups of women's returns to education increased over

Table 8. Pay Structure of Minority/Sex Groups, for Four Cohorts, 1963-1977, Predicting Entry Salary

	Independent Variables	Cohorts				1972-73 Entry Salary as a % of 1963-65
		1963-65	1966-68	1969-71	1972-73	
White Males	Education	758***	900***	884***	550***	
	Entry Age	1307***	935***	196	329	
	Entry Age^2	-14.97***	-10.72***	.59	-2.41	
	D.C.	2633***	751	1788*	3433***	
	Disabled Vet.	-1988#	-596	-2021#	-448	
	Other Vet.	-1012#	-433	89	-94	
	R^2 (adjusted)	.390	.412	.456	.313	
	N	300	387	193	254	
	$\bar{X}$ Entry Salary	$12,843	$12,506	$12,199	$11,274	87.8
White Females	Education	438***	553***	1026***	515***	
	Entry Age	215**	214*	222	353#	
	Entry Age^2	-3.16**	-2.77#	-2.16	-4.73*	
	D.C.	411	1042**	-2	45	
	Disabled Vet.	-461	-598	--	--	
	Other Vet.	439	207	476	1433#	
	R^2 (adjusted)	.312	.301	.513	.204	
	N	169	252	105	237	
	$\bar{X}$ Entry Salary	$8,047	$8,029	$8,929	$8,118	100.9
Minority Males	Education	814*	950***	286	566*	
	Entry Age	124	-698	596	1212*	
	Entry Age^2	-2.24	16.26*	-8.42	-16.97*	
	D.C.	-2530	674	-301	-1420	
	Disabled Vet.	-182	1396	-71	-2410	
	Other Vet.	3215	-580	1553	-1924#	
	R^2 (adjusted)	.09	.590	.069	.253	
	N	22	43	23	63	
	$\bar{X}$ Entry Salary	$11,033	$10,163	$9,427	$10,735	97.3
Minority Females	Education	140*	608***	1008***	393***	
	Entry Age	-81	-281	535#	352***	
	Entry Age^2	.97	5.61#	-7.92#	-5.21**	
	D.C.	-194	-178	-598	279	
	Disabled Vet.	-52	-1637	--	--	
	Other Vet.	428	-520	231	-1004	
	R^2 (adjusted)	.085	.243	.328	.402	
	N	48	100	59	78	
	$\bar{X}$ Entry Salary	$7,522	$7,879	$7,866	$6,980	92.8

this period probably reflects the ability of women to enter higher paying male-dominated occupations in which higher education could be rewarded with higher salaries.

Given the very small sample sizes of both minority males and females, conclusions regarding pay differences over time and with white males are somewhat tenuous. However, it does appear that the returns to education at entry are generally lower than for white males, although the coefficients are not significantly different. Indeed, by the 1972-73 cohort, the return to one year of education at the mean varied from $393 for minority females to $566 for minority males. The finding that the returns to education did not vary as expected by minority/sex group could be affected by the construction of the cohorts. Although these data predict the effects of human capital on entry salary, the persons in this sample consist of those who were still on-board in 1977. If the Federal government is a better employer for minorities and women than the private sector, then minorities and women will be less likely to leave government service than, for example, white males who might get better returns on their education in the private sector. Only those white males with relatively high returns to their education would then stay in the Federal government.

Also noteworthy is the fact that the 1969-71 cohort shows the highest rate of return to education for women. In fact, it is the only cohort in which either group of women had higher returns to education than both groups of men. It would be difficult to isolate any one factor as the causal mechanism for the changeabout, but it seems reasonable to assume that President Johnson's 1967 Executive Order and Executive Order 92-261 (1969) issued by President Nixon both acted to spur an impetus to hire and promote women in the Federal civil service. The effects of these Executive Orders do not seem exceptionally long-lived as the return to education dropped dramatically for both groups of women by the 1972-73 cohort. However, the returns to education for women in the 1972-73 entry cohort at least remained greater than the returns to education for the 1963-65 cohort.

Although location of employment at the time of entry into the Federal government would be expected to have an effect on salary, location in the "home office" or D.C. seems to be only consistently positive in its effect on salary for white males. White males benefit around $2,000 or more for entering the Federal civil service in D.C. Other minority/sex groups show no consistent or statistically significant pattern over the cohorts for entering Federal employment in D.C.

On the other hand, entry age generally yields about a $300 per year salary increase for each year of age, although the exact estimates of returns to age do vary widely across the minority/sex groups and over time. Indeed, both groups of women seem to have far more stable returns to age than do either group of men. This again may reflect part of the recruiting pattern of males by age due to the Vietnam War. If entry age is increased for males due to military service, and if the relationship between veterans' preferences and salary is negative, then a declining effect of entry age on salary is not surprising, provided that women enter Federal civil service at younger ages than men.

The veterans' preference variables should provide some information to assess the plausibility of the above argument. However, the results on the effect of veterans' preference on entry salary are somewhat mixed. In contrast to the cross-section analysis performed elsewhere (Taylor, 1979), veterans' preference is not strongly related to salary. Moreover, only 18 of the 28 coefficients for disabled veterans and other veterans are negative, and only five of the coefficients approach statistical significance. The lack of correspondence between the cross-section results and the cohort analyses presented here suggests that the negative effects of veterans' preference show up later in the employment process rather than at entry.

Finally, we should note that the explained variance accounted for by only these human capital variables does not appear to be explaining as large a proportion of the variance in entry salary as in current salary. The reason for this may also help to explain the different patterns in the returns to education by sex. If standardized tests have been used in a greater number of job hires from 1963 to 1973, it is quite possible that the returns to education at entry for males would have declined over this time period since the standardized tests are used to both supplement and in some cases, supersede, educational requirements. This is not the case for women, however, for even though women have begun to move into male-dominated occupations, they may do so in such small numbers that substituting test scores for educational criteria would have little impact. Hence, women are evaluated more on the basis of their education to be placed into the level of their occupation such as secretary or administrative assistant, while men may be placed into their entry position by a test score.

In summary, the 1969-71 cohort generally has the largest explained variance, similar to having the largest effects on returns to education. The unique characteristics of this cohort suggests again the importance of timing in the career of an individual employee.

A Review of the Federal Civil Service as an Internal Labor Market

The foregoing summary of work funded by the Department of Labor is at once an examination of the pay determination of Federal civil servants as well as a study of the extent to which the Federal government operates as a labor market similar to the private sector. That education, age, and occupation appear to have effects on salary similar to the private sector is not surprising, given that Federal pay is set to pay in the private sector. These general findings, as well as others (see Grandjean, 1981), support the argument that in many respects the Federal government is an internal labor market, albeit large and heterogeneous. And although it is a labor market where seniority seems to be rewarded there are some indications that career paths are established early in the individual's employment history (O'Leary *et al*., 1978:xii).

There are at least two findings which require special comment since the Federal government seems to depart from models of the private sector, and these departures might indicate the extent to which the Federal government does not respond to labor supply and demand conditions as do private employers. On the other hand, the findings presented here regarding the Federal service may provide insights into theories of earnings as we have been able to examine some employment-related factors not generally available in other studies. Throughout this discussion, we will refer to the work of two teams of researchers who have previously received funding from the Department of Labor for preliminary investigations into the operations of the Federal government, Couturier et al., 1979, of Northwestern University, and O'Leary, et al., 1978, of Operations Research, Incorporated.

One keystone of human capital theory is that training, whether in education, on-the-job experience, or vestibule training, enhances a worker's productivity and plays an important part in wage determination. According to O'Leary et al. (1978:xii), the Federal government significantly outspends its private sector counterpart on training, but little is known about its relation to promotion, mobility, etc. Our findings run somewhat counter to the expectations of human capital theory. While training is significantly related to salary for entry employees, the type of training receiving the greatest return is specific rather than general. This finding may not be incompatible to human capital theory, but rather it may suggest the need to incorporate more specifically the nature of the labor market within which any training is received.

We know, for example, that Federal personnel policies are designed to foster occupational and agency mobility (O'Leary et al., 1978:xiii). This is achieved by regulations which encourage, through lowered cost and time, the internal promotion of employees. In the Federal government, competitive transfer rights mean that employees have more control over mobility than workers in the private sector (O'Leary, 1978:13-13). In fact, "81 percent of all accessions are transfers, reassignments, promotions, or reinstatements" (Couturier, et al., 1979:39). This means that those employees who know specific Federal government jobs are at a decided advantage over employees from outside the Federal labor market. Moreover, many programs administered by the Federal government are of a decidedly political nature and therefore susceptible to changes in political administrations. Keeping employees with specific training is of paramount interest to a program manager if he or she is to implement and show an effect of a program within a four year span.

Finally, the size of the Federal government very likely means that there are subdivisions which compete for the most talented and well-trained employees (Couturier et al., 1979:8; O'Leary et al., 1978:xiii). Hence, our theories of training may need to consider the size of an employer, the number of administrative units within a firm, etc., and the personnel regulations which affect employee movement within the firm. Given these constraints, we can see that the effects of specific training and job change may reflect organizational characteristics rather than simply individual attributes.

We do not think that this finding indicates that the Federal government is a labor market too different from private sector internal labor markets for useful comparisons. Rather, this finding should be taken as illustrative of problems using a human capital perspective without regard to the presence and type of internal labor markets in which workers' characteristics are being evaluated.

A second finding which may serve to illustrate the nature of the Federal bureaucratic labor market is the result of the analysis of minority/sex inequality. Since the mid-1960's, the Federal government has had an active affirmative action program. In fact, one might argue that the initiation of merit criteria for hiring and promotion in 1883 was the start of practices which would eventually lead to non-discrimination policies. Our findings on income inequality are compatible with those from other studies which suggest that the Federal government rewards its employees more nearly the same than does the private sector.

An internal labor market which has a commitment to equal opportunity efforts is more likely to show greater similarity in salary between minorities and whites, and between men and women, than one which does not. For example, programs which emphasize enhanced skills for greater employability are more likely to have an effect within a labor market where the skills are tied to a job. Such has been the reasoning behind upward mobility programs and training (see Couturier et al., 1979:317; O'Leary et al., 1978:2-16). Training only benefits employees and employers alike if it provides something to both which neither had previously. Thus, training programs which show the biggest returns are those where there is a maximum possibility of job advancement. Under affirmative action in the Federal government, upward mobility programs have been designed to that end. While we do not know whether training received by employees is under upward mobility programs or not, it does seem more likely that minorities and women would be in those programs than white males. Thus, our finding that women and minorities receive a greater private return to IJT than do white males may in part be due to the particular programs advanced in the Federal government.

This is not to argue that upward mobility programs are pervasive in the civil service or that the training effect observed here for minorities and women is due directly to such programs. Rather, there is a generalized belief indicated by the presence of EEO efforts, that what minorities and women need is more and better training. Should they receive such training, there is the expectation that their employability will increase. Hence, training effects are probably due to increased skills, a belief in the training process itself, and the increased contacts and thus greater mobility prospects of employees who receive training.

Conclusions

Perhaps as many as one-half to three-quarters of all workers in the U.S. are employed in internal labor markets (Caplow, 1954; Doeringer and Piore, 1971), with four percent of all workers employed in the Federal civil service. Given the wide variety of labor markets in both product and organization, processes of wage determination are likely to be affected by many more criteria than first proposed in studies of job training. This observation does not necessarily mean that our theories of wage determination are incorrect, only that the parameters of various labor markets impose constraints on wage determination. We argue here that knowing the characteristics of a particular labor market can inform our understanding of the wage process, and also refine our theories of labor market behavior.

Our work on the Federal civil service, in part funded by the Department of Labor, is continuing to study the effects of training, minority/sex status, and earnings function of blue-collar versus white-collar workers. We are presently at work on a book manuscript which we hope will offer in greater detail information on these as well as other areas of interest.

APPENDIX I:

Objectives and Hypotheses

I. Blue-Collar Workers

Hypothesis (1). Years of schooling and amount of on-the-job training will be positively associated with salary among blue-collar workers.

Hypothesis (2). The association in H(1) will be stronger for non-minority males than for any other minority/sex group.

Objective (1). Does the pay structure (i.e., the determinants of earnings) of blue-collar workers differ from that of white-collar workers?

II. Training

Hypothesis (3). Returns to training will be greater for non-minority males than for any other minority/sex group.

Hypothesis (4). Individual salary returns to general training will exceed those to specific training.

Objective (2). What is the annual cost of general and specific training in dollar outlay for employees who remain in the Federal service and for those who leave?

III. Equal Employment Opportunity

Hypothesis (5). Among white-collar workers, salary discrimination by race and sex has declined from 1967 to 1977.

Objective (3). What changes have occurred in the pay structures of the minority/sex groups over time?

Education is measured in approximate years, from 6 (some elementary school) through 22 (post-doctoral work). Age in years is computed from year of birth.

Seniority refers to the number of months spent in active Federal civilian employment since entry. In our cohort analyses, this variable reflects both breaks in service of more than a month and differences in the precise date of entry within the time span defining the cohort. For the longterm employees and in cross-sectional analyses which include pre-1963 entrants, exact seniority cannot be computed from the data available. However, months of Federal service can be inferred with fair accuracy from the "service computation date" maintained on each employee's records for leave accrual purposes. The resulting estimate of seniority includes military service for most veterans, but fortunately military duty is not reflected in the service computation date of retired military careerists, for whom the overestimate of Federal civilian seniority would otherwise be most severe.

Our analyses also include dummy variables for minority group membership (black, Spanish-surnamed, Puerto Rican, American Indian, Oriental, Aleut, and Eskimo) and for sex or for minority/sex group combination.

Blue-collar entry is a dummy variable based on the employee's first occupation in the Federal service. Employees in a handful of service occupations categorized as blue-collar in the Census occupational classification but paid on a national salary scale such as the General Schedule are classed as white-collar workers under the OPM scheme (see Bureau of Policies and Standards, 1978). Since the salary criterion helps define the boundary of the white-collar Federal labor market, the OPM classification of occupational collar-color is adopted here.

Two veterans' preference dummy variables are included in our analyses, one for disabled veterans and one for all others entitled to a preference. This approach is chosen to minimize the degree to which the expected positive effect of the preference is confounded by a possible negative effect of physical disability on socioeconomic achievement.

Agencies are grouped into five categories based both on functions and on similarities in patterns of growth between 1960 and 1977. The four resultant dummy variables include: (1) defense-related agencies (Defense and State, plus the Selective Service, the National Security Council, and the U.S. Information Agency); (2) the Postal Service; (3) the Veteran's Administration (plus the Soldiers' and Airmen's Home); and (4) a group of social service agencies (principally HEW and HUD, plus the Railroad Retirement Board, the Commission on Civil Rights, the Equal Employment Opportunity Commission, the Office of Economic Opportunity, and the Community Services Administration). The comparison category consists of all other departments, agencies, and commissions for which OPM maintains personnel records.

Finally, employment in the D.C. metropolitan area, civil service "headquarters," is represented by a dummy variable.

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